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Working Party on National Accounts**Revisions in quarterly GDP of OECD and key partner countries: An update****Meeting of the Working Party on National Accounts****8 November 2018****OECD Conference Centre**

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Abstract

This paper examines the revision histories of 29 OECD member countries and 4 OECD key partner countries. It analyses the various vintages of gross domestic product (GDP) estimates, using quarterly estimates from the second quarter of 1995 up to and including the first quarter of 2018. In addition to GDP growth estimates, the analysis also looks at revisions to the main underlying expenditure components. Using a set of summary statistics (mean revision, mean absolute revision and relative mean absolute revision) it aims at discussing the differences across countries in order to improve the overall quality of early estimates.

With respect to earlier OECD studies, the paper includes some additional analyses such as a runs test to check the randomness of the sequence of revisions around the median and regression analyses to test whether revisions are correlated with the growth rates and/or the change in growth rates. Both analyses may point to a specific bias in the first estimates and may assist compilers in further improving their estimates.

The main outcomes of the GDP cross-country analysis are: (1) on average, countries have upward revisions, (2) a group of twelve countries (Austria, Belgium, the Czech Republic, Finland, Germany, Iceland, Luxembourg, Poland, the Slovak Republic, Spain, Sweden and the United States) have mean revisions that are not statistically significant, (3) for Australia, Denmark, Indonesia and Ireland short term mean revisions are statistically significant, (4) for most countries the sequence of revisions is random, (5) there is no evidence of revisions becoming smaller over time, (6) the direction of change and of the acceleration/deceleration of growth is in most of the cases not altered by the revisions, and (7) gross fixed capital formation and trade flows are the expenditure components with the largest revisions.

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I. INTRODUCTION

1. The purpose of this paper is to extend the work initiated by Di Fonzo (2005a and 2005b), updated by McKenzie and Adam (2007) and by Zwijnenburg, Ribarsky, Raso and Kim (2014). It examines the revisions histories of twenty-nine OECD member countries and four OECD key partner countries for the first estimates of quarter-on-quarter (QoQ) and year-on-year (YoY) GDP volume growth rates and its main expenditure components. The analysis is based on the OECD MEI Revisions Analysis dataset¹. Growth rates are derived from seasonally adjusted indicators to facilitate international comparisons.

2. The study focuses on those countries in the dataset for which the length of their time series allows for statistical analysis². This concerns twenty-nine OECD member countries (Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland³, Iceland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States) and four OECD key partner countries (Brazil, India, Indonesia and South Africa)⁴. The graphs and tables also show the OECD unweighted average based on the OECD countries included in the study⁵.

3. A number of changes have been made in comparison to the information presented in the previous paper by Zwijnenburg, Ribarsky, Raso and Kim (2014). The five major additions are:

- More OECD member countries as well as some OECD key partner countries have been included in the analysis;
- The dataset has been extended up to and including the first quarter of 2018;
- Runs tests have been performed to check randomness of the sequence of revisions to QoQ growth rates;
- Simple linear regressions have been conducted to check whether revisions are correlated with the latest estimates and/or with the change in growth rate;
- Metadata related to the implementation of 1993/2008 SNA methodologies and changes in seasonal adjustment have been included (see Table 7 in the Annex).

4. The paper is organised as follows. Section II presents the methodology, including the main indicators that have been used for measuring the revisions. Subsequently, Section III briefly discusses the main reasons for revisions in order to get a better understanding of how to interpret them. Main results are presented in Section IV⁶, first looking at GDP growth rates and then at its main components. Section V presents the main conclusions.

¹ This interface provides access to time series data for 21 key economic variables as originally published in each monthly edition of the OECD Main Economic Indicator from February 1999 onwards. The data base is accessible via OECD.Stat at the following address: https://stats.oecd.org/Index.aspx?DataSetCode=MEI_ARCHIVE

² The time span considered for each country is given in the Annex - Table 6. For some countries the starting reference quarter of the series has been adjusted in comparison with the previous study to exclude quarters for which the first estimates pre-date the publication time window as included in the MEI revisions dataset. This may have affected some of the results as presented in Zwijnenburg, Ribarsky, Raso and Kim (2014).

³ For the purpose of the analysis, data for Ireland have been adjusted to remove the impact of the significant upward revision in 2015 GDP growth rates (the annual real growth rate for 2015 was revised up to 26.3%) as published by the Central Statistics Office (CSO) in July 2016 (see the following [link](#)). For more information on this revision, see the explanatory methodological documentation at the following [link](#). The revisions to GDP and its main components have been adjusted for the relevant quarters of 2015 to correct for this specific revision. Furthermore, subsequent releases of these quarters have been adjusted to smooth out the effect of this revision.

⁴ The key for country acronyms as used in the tables and graphs is included in Annex – Table 6.

⁵ Seven OECD member countries (Chile, Estonia, Greece, Israel, Latvia, Lithuania and Slovenia) are not included in the analysis because the time series as included in the OECD MEI_ARCHIVE dataset cover less than 10 years.

⁶ Detailed results by country will become available at the end of October 2018 as a separate annex.

II.METHODOLOGY

5. The methodology used in this paper relies on the previous OECD papers (Di Fonzo 2005a; McKenzie and Adam 2007). The summary indicators used are also similar to the ones used in the previous revision study by Zwijnenburg, Ribarsky, Raso and Kim (2014). Some additional indicators have been added to obtain more insight in the potential bias in the first estimates. The indicators are defined as follows, using the following terminology:

- L_t is the latest estimate,
 - P_t is the preliminary (or earlier) estimate,
 - $R_t = L_t - P_t$ is the revision,
 - n is the number of observations.
- **Mean revision (MR):** The primary interest of this measure lies in its sign and provides an indication of systematic patterns in the revision process. A positive (negative) sign indicates that, on average, earlier releases have been underestimated (overestimated). Large revisions of opposite sign compensate each other in this measure, and, consequently, its size, beyond determining the average direction of revisions, is of limited use.

$$\bar{R} = \frac{1}{n} \sum_{t=1}^n (L_t - P_t) = \frac{1}{n} \sum_{t=1}^n R_t$$

To evaluate the statistical significance of the mean revision, a simple and robust approach based on the Heteroscedasticity Autocorrelation Consistent (HAC) estimate's variance proposed by Newey and West (1987) is used. It tests the hypothesis that MR is equal to zero.

- **Mean absolute revision (MAR):** This measure is more useful than the mean revision to gauge the size of revisions because it avoids offsetting effects on the indicator from negative and positive revisions. Expressed in absolute percentage points, it indicates the average size of revisions, but it cannot provide an indication of directional bias, if any.

$$MAR = \frac{1}{n} \sum_{t=1}^n |L_t - P_t| = \frac{1}{n} \sum_{t=1}^n |R_t|$$

- **Relative mean absolute revision (RMAR):** This measure corrects the mean absolute revision for the size of growth rates and, so, takes account of the fact that revisions might be expected to be larger in periods of high GDP growth than in periods of slow growth. It also leads to an improved comparability of the results across countries. Since it is presented in a relative form, the calculated values have no unit.

$$RMAR = \frac{\sum_{t=1}^n |L_t - P_t|}{\sum_{t=1}^n |L_t|} = \frac{\sum_{t=1}^n |R_t|}{\sum_{t=1}^n |L_t|}$$

- **Direction of change test:** This test checks the relative number of times that the sign of the initial growth estimates is equal to that of the later estimates. For that purpose, it assesses whether one of the two following conditions is satisfied:
 - $\Delta GDP_t^a > 0$ and $\Delta GDP_t^b > 0$
positive growth in both cases
 - or
 - $\Delta GDP_t^a < 0$ and $\Delta GDP_t^b < 0$
negative growth in both cases

where Δ is the operator calculating the first differences of a series, and a and b stand for two different vintages of quarterly GDP estimates for the same quarter. Results are presented as percentage of the number of observations.

- **Acceleration/deceleration test:** This measure checks the relative number of times that the sign of the change in growth estimates (either accelerating or decelerating) is equal to that of the later estimates. For that purpose, it verifies whether one of the two following conditions is satisfied:
 - $\Delta\Delta GDP_t^a > 0$ and $\Delta\Delta GDP_t^b > 0$
both acceleration
 - or
 - $\Delta\Delta GDP_t^a < 0$ and $\Delta\Delta GDP_t^b < 0$
both deceleration

where $\Delta\Delta$ is the operator calculating the second differences of a series, and a and b stand for two different vintages of quarterly GDP estimates for the same quarter. Results are presented as percentage of the number of observations.

- **Runs test:** This non-parametric statistical test checks the randomness of the sequence of revisions of QoQ GDP growth rates, looking at how revisions revolve around the median over time. A run in the test is defined as the consecutive sequence of zeros (revisions below the median) and ones (revisions above the median). For example, the sequence of “1110110001” has 5 runs, with 3 runs of “1” and 2 runs of “0”. To check whether the sequence of revisions above and below the median is random, it has to be checked whether the number of runs is significantly higher or lower than expected. The expected number of runs (\bar{R}) is equal to

$$\bar{R} = \frac{2n_1n_2}{n_1 + n_2} + 1$$

where R is the total number of runs, n_1 is the number of “0” in the series and n_2 is the number of “1” in the series. In the example as presented above, R equals 5, n_1 equals 4, and n_2 equals 6. The expected number of runs would be 5.8 in this example.

The null hypothesis (H_0) is that the sequence is produced in a random manner. When the sample size is large enough, the test statistic is compared to a standard normal table. This means that the test statistic is:

$$Z = \frac{R - \bar{R}}{\sigma}$$

in which

$$\sigma = \frac{2n_1n_2(2n_1n_2 - n_1 - n_2)}{(n_1 + n_2)^2(n_1 + n_2 - 1)}$$

The runs test rejects the null hypothesis if

$$|Z| > Z_{1-\alpha/2}$$

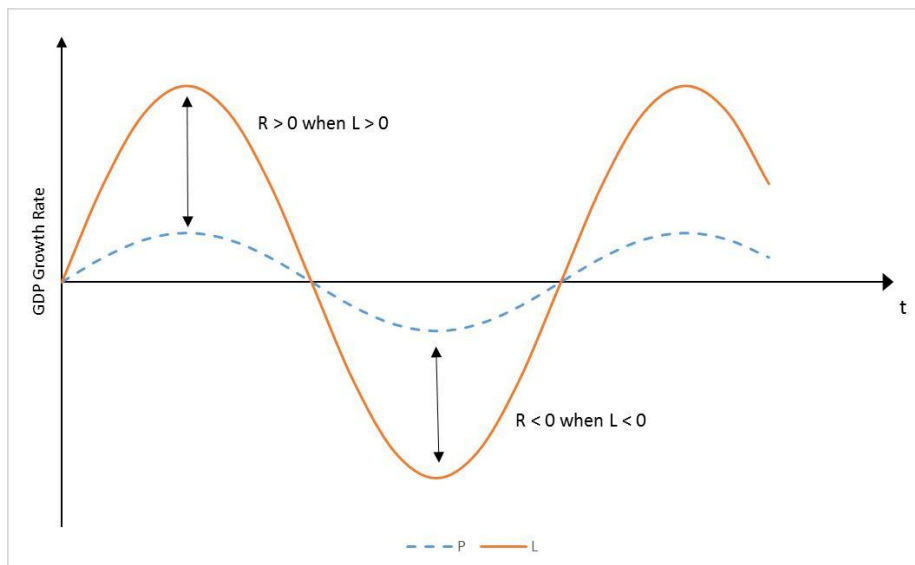
where α is the significance level.

- **Regression against growth rate:** This test assesses on the basis of simple linear (ordinary least squares) regression whether the revisions are correlated with the growth rates, i.e. higher upward revisions in case of higher positive growth rates and larger downward revisions in case of larger negative growth rates. For this purpose, a simple regression model is used in which revisions are presented as a function of the latest estimates:

$$R_t = \beta L_t + \varepsilon$$

If there is a positive correlation (i.e. $\beta > 0$), this may point to potential dampening of GDP growth rates for the first estimates (see Figure 1).

Figure 1. Interpretation of β from regression against growth rates

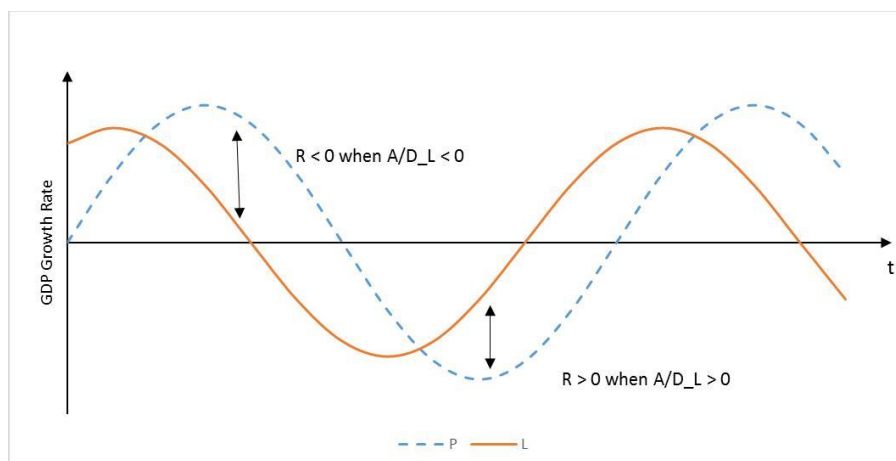


- **Regression against acceleration/deceleration:** This test assesses on the basis of simple linear (ordinary least squares) regression whether revisions are correlated with changes in growth rates (i.e. acceleration/deceleration), i.e. higher upward revisions in case of higher acceleration and larger downward revisions in case of higher deceleration. For this purpose, a simple regression model is used in which revisions are presented as a function of the change in growth rate of the latest estimates:

$$R_t = \beta A/D_L_t + \varepsilon$$

If there is a positive correlation (i.e. $\beta > 0$), this may point to a potential delay in capturing turning points in the business cycle (see Figure 2).

Figure 2. Interpretation of β from regression against acceleration/deceleration



III. INTERPRETING REVISIONS

6. Before analysing revisions, it is important to understand how to interpret revisions and the reasons why they occur. Even if one may think that the absence of revisions indicates high data quality, it is actually the opposite in many cases. Indeed, just because a statistic is not often revised it may still be inaccurate if it is based on poor data sources that are not updated.

7. Reasons for revisions can broadly be defined by two categories: 1) statistical and 2) methodological/definitional:

- **Statistical revisions** can occur by replacement of early source data or rough estimates with later data that incorporates improved and more comprehensive data. It also encompasses corrections of errors that have been encountered after the first publication of the data. Furthermore, it includes updating seasonal and working day adjustment factors which can cause sizeable revisions to quarterly growth rates even if the underlying not seasonally adjusted data is unrevised.
- **Methodological/definitional changes** are generally a one-time occurrence and tend not to reflect inaccuracies in data sources. These revisions occur due to major improvements in the national accounts compilation process (e.g., changing benchmarking techniques for the quarterly estimates or introduction of chain-linking) or when the national accounts are brought in line with international standards, such as moving from 1968 SNA to 1993 SNA, or from 1993 SNA to 2008 SNA⁷. With regard to the latter, Table 7 in the Annex includes an overview of the implementation dates at which various countries in the analysis moved to 1993 SNA and to 2008 SNA⁸.

8. In analysing the results of revision studies, one has to take into account these two categories, and it would be best if revisions could be distinguished for these two categories, as they may lead to different conclusions. For instance, significant revisions in GDP growth rates that are caused by methodological changes do not imply that there is a bias in the early estimates. It may point out that substantial improvements have been implemented in the methodology. However, when the same significant revisions occur due to statistical revisions, this may be an indication of a bias in the early estimates and an incentive for statistical offices to further investigate the specific causes for these revisions. As more precise quantifications of the reasons for revisions are lacking, the results from the analyses have to be interpreted with some caution before drawing sharp conclusions.

9. In analysing the results presented in the next paragraph it should also be borne in mind that, as a longer time period has been applied in the analyses, some improvements may already have taken place to address some of the underlying causes for the revisions. Earlier revisions may then distort the current picture and may wrongly signal that action is still needed.

⁷ The System of National Accounts (SNA) consists of a coherent, consistent and integrated set of macroeconomic accounts; balance sheets and tables based on a set of internationally agreed concepts, definitions, classifications and accounting rules.

⁸ The information on the implementation dates has been derived from information provided by countries or by analysis of the data stored in the MEI_ARCHIVE dataset. Countries are invited to check the implementation dates mentioned in the Annex - Table 7 and to contact the Secretariat in case of any errors.

IV. CROSS-COUNTRY ANALYSIS: MAIN RESULTS

A. GDP analysis

a) Mean revision and assessment of statistical significance

10. Figure 3 and Figure 4 show the mean revision (MR) for respectively QoQ and YoY growth rates at five time intervals: 5 five months after (M5_P), one year after (Y1_P), two years after (Y2_P), three years after (Y3_P) and five years after the first published estimate (Y5_P). It reveals that most countries have upward revisions for these intervals. However, three countries (Poland, the Slovak Republic and Sweden) actually have downward revisions at all intervals. Among OECD countries, four (Denmark, Iceland, Ireland and Turkey) have QoQ revisions well above the OECD average at all intervals. This is also the case for the OECD key partners India, Indonesia and South Africa. The revisions amplitude is particularly high for Turkey, especially for revisions of QoQ growth rates three and five years after the first published estimates (Y3_P and Y5_P).

11. Figure 4 points out that almost one third of the countries (Australia, Brazil, Canada, India, Ireland, Korea, the Netherlands, New Zealand, South Africa, Portugal, Switzerland, Turkey and the United Kingdom) revise positively, on average, their YoY growth rates by more than 0.2 percentage point (pp) after 3 and 5 years. On the other hand, the United States revise them negatively by more than 0.25 pp.

Figure 3. Mean Revision to first published estimates of QoQ growth rates for GDP

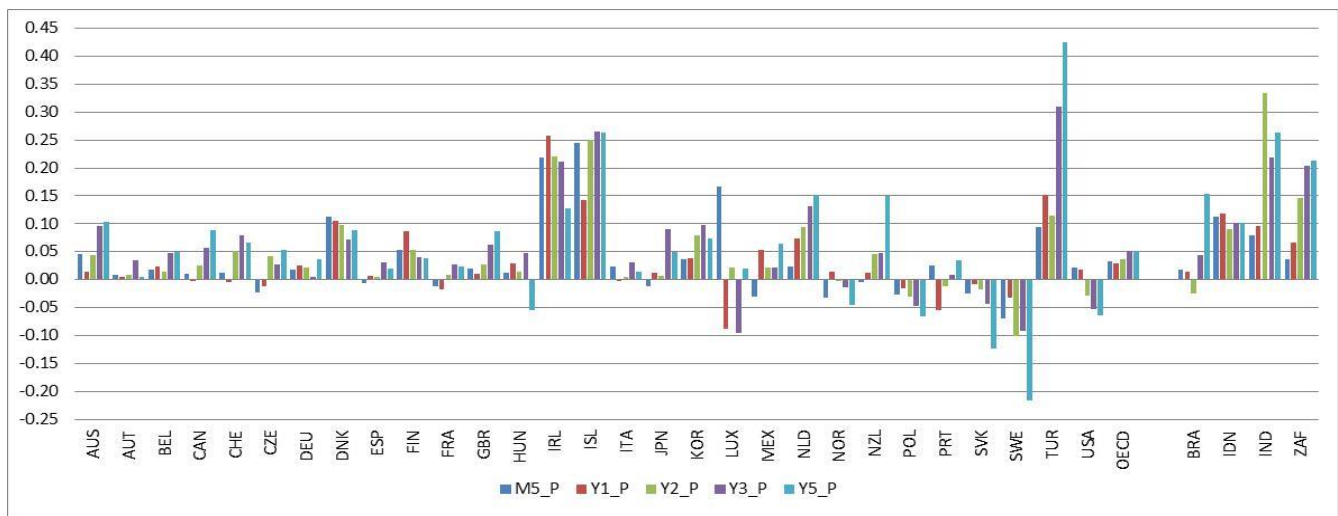
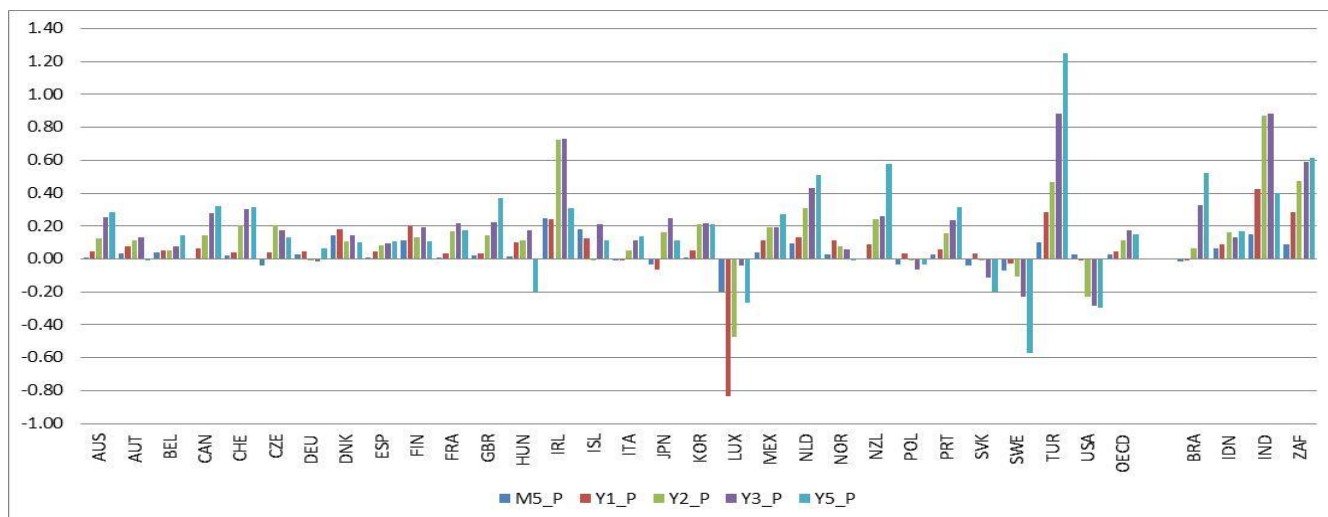


Figure 4. Mean Revision to first published estimates of YoY growth rates for GDP



12. In looking at the mean revisions, it is interesting to see for which countries these turn out to be statistically significant. Table 1 presents the assessment of statistical significance at the 10% (green), 5% (orange), or 1% (red) level for the QoQ and YoY mean revision at the five main time intervals⁹.

⁹ Additional sub-intervals for Y1_M5, Y2_Y1, Y3_Y2 and Y5_Y3 are provided in the Annex - Table 8.

Table 1. Mean revision and assessment of statistical significance for GDP QoQ and YoY growth rates

Country	M5_P		Y1_P		Y2_P		Y3_P		Y5_P	
	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY
AUS	0.05	0.01	0.02	0.05	0.04	0.13	0.10	0.25	0.10	0.28
AUT	0.01	0.04	0.01	0.07	0.01	0.11	0.04	0.13	0.01	0.00
BEL	0.02	0.04	0.02	0.05	0.01	0.05	0.05	0.08	0.05	0.14
CAN	0.01	0.00	0.00	0.06	0.03	0.14	0.06	0.28	0.09	0.32
CHE	0.01	0.02	0.00	0.04	0.05	0.21	0.08	0.30	0.07	0.31
CZE	-0.02	-0.04	-0.01	0.04	0.04	0.21	0.03	0.17	0.05	0.13
DEU	0.02	0.03	0.03	0.05	0.02	0.00	0.00	-0.01	0.04	0.06
DNK	0.11	0.15	0.10	0.18	0.10	0.11	0.07	0.14	0.09	0.10
ESP	-0.01	0.01	0.01	0.05	0.00	0.08	0.03	0.10	0.02	0.11
FIN	0.05	0.11	0.09	0.20	0.05	0.13	0.04	0.19	0.04	0.11
FRA	-0.01	0.01	-0.02	0.03	0.01	0.17	0.03	0.22	0.02	0.17
GBR	0.02	0.02	0.01	0.03	0.03	0.14	0.06	0.22	0.09	0.37
HUN	0.01	0.02	0.03	0.10	0.02	0.11	0.05	0.18	-0.06	-0.20
IRL	0.22	0.25	0.26	0.24	0.22	0.72	0.21	0.73	0.13	0.31
ISL	0.24	0.18	0.14	0.13	0.25	0.00	0.26	0.21	0.26	0.11
ITA	0.02	0.00	0.00	-0.01	0.01	0.05	0.03	0.11	0.01	0.14
JPN	-0.01	-0.04	0.01	-0.07	0.01	0.16	0.09	0.25	0.05	0.11
KOR	0.04	0.01	0.04	0.05	0.08	0.21	0.10	0.21	0.07	0.21
LUX	0.17	-0.20	-0.09	-0.83	0.02	-0.47	-0.10	-0.04	0.02	-0.27
MEX	-0.03	0.04	0.05	0.11	0.02	0.19	0.02	0.19	0.06	0.27
NLD	0.02	0.09	0.07	0.13	0.09	0.31	0.13	0.43	0.15	0.51
NOR	-0.03	0.03	0.01	0.11	0.00	0.07	-0.01	0.06	-0.04	0.00
NZL	0.00	0.00	0.01	0.09	0.05	0.24	0.05	0.26	0.15	0.58
POL	-0.03	-0.03	-0.02	0.03	-0.03	-0.01	-0.05	-0.07	-0.07	-0.04
PRT	0.03	0.03	-0.06	0.06	-0.01	0.16	0.01	0.23	0.04	0.32
SVK	-0.02	-0.04	-0.01	0.04	-0.02	0.00	-0.04	-0.12	-0.12	-0.20
SWE	-0.07	-0.07	-0.03	-0.03	-0.10	-0.11	-0.09	-0.23	-0.22	-0.57
TUR	0.09	0.10	0.15	0.29	0.11	0.47	0.31	0.88	0.42	1.25
USA	0.02	0.03	0.02	-0.01	-0.03	-0.23	-0.05	-0.28	-0.06	-0.30
OECD	0.03	0.03	0.03	0.04	0.04	0.12	0.05	0.18	0.05	0.15
BRA	0.02	-0.01	0.01	-0.01	-0.03	0.07	0.04	0.33	0.15	0.52
IDN	0.11	0.07	0.12	0.09	0.09	0.16	0.10	0.13	0.10	0.17
IND	0.08	0.15	0.10	0.43	0.33	0.87	0.22	0.88	0.26	0.40
ZAF	0.04	0.09	0.07	0.28	0.15	0.48	0.20	0.59	0.21	0.62

13. Several observations can be made on the basis of Table 1, Table 8 in the Annex and the previous graphical analysis:

- There is no tendency for the MRs, in both short-term and long term, to be statistically significant for twelve OECD countries included in the analysis (Austria, Belgium, the Czech Republic, Finland, Germany, Iceland, Luxembourg, Poland, the Slovak Republic, Spain, Sweden and the

United States). Their MRs for QoQ and YoY growth rates are not statistically significant at the 10% level for any of the time intervals.

- Short-term revisions of QoQ growth rates (M5_P and Y1_P) are randomly distributed around zero at a 95% confidence level for almost all countries, except for Australia, Denmark, Indonesia and Ireland for the M5_P interval and for Indonesia for the Y1_P interval. The revisions for YoY growth rates present a similar picture, with only Denmark, Indonesia, Ireland, the Netherlands and South Africa reporting significant revisions for the M5_P interval and Denmark, India, Indonesia, the Netherlands and Turkey for the Y1_P interval.
- The Y1_M5 indicator (see Table 8 in the Annex), which emphasizes the importance of the additional information added between five months and one year after the reference period, is statistically significant at a 5% level for only three countries: Canada, Poland and South Africa. On the other hand, the Y2_Y1 indicator, providing insight in the importance of additional information added between one and two years after the reference period, is statistically significant at a 5% level for seven countries, i.e. France, Italy, Korea, the Netherlands, Portugal, South Africa and Switzerland, while the Y3_Y2 indicator, emphasizing the revision between two and three years after the reference period, is statistically significant at 5% for six countries, i.e. Australia, Brazil, Japan, the Netherlands, South Africa and Switzerland. Furthermore, for Germany (QoQ) and New Zealand (YoY) the revision between three and five years (Y3_Y5) after the first published estimate is statistically significant at 5%.
- The average MR for all OECD countries involved in the analysis is very close to zero for both QoQ (0.03 and 0.03) and YoY (0.03 and 0.04) growth rates at the short-term intervals M5_P and Y1_P. However, at the long-term intervals, the average mean revision for YoY growth rates is relatively higher than the average for QoQ growth rates. Especially the YoY revisions for Y2_P (0.12 pp), Y3_P (0.18 pp) and Y5_P (0.15 pp) are noteworthy in this respect. Most countries report significant revisions for those intervals. However, it should be noted here that this may be caused by effects of major changes in methodology, which are more plausible to occur in longer time periods contrary to short-term revisions which usually include only minor methodological changes.

14. Table 2 reports the results of the runs test which assesses the randomness of the sequence of revisions to QoQ GDP growth rates around the median. For each time interval, there are two columns, showing respectively the number of runs (column R) and the total number of quarters in the sample (column N). The colours of the cells show whether the number of runs is significantly different from the expected number of runs at the 10% (green), 5% (orange) and 1% (red) level.

15. The sequence of revisions around the median seems to be random for almost all countries for all time intervals. However, the sequence does not appear random for France for short-term revisions (M5_P and Y1_P), as well as for Mexico (Y3_P), Norway (Y1_P, Y2_P and Y3_P), Spain (Y2_P), the United Kingdom (Y3_P and Y5_P) and the United States (Y5_P) at some of the time intervals.

16. The results of the runs test in Table 2 can be very different from the test of statistical significance of the mean revision as presented in Table 1. Whereas the latter examines whether the revisions are statistically significant different from zero, the runs test focuses on randomness of the sequence of the revisions around the median. Thus, these findings are complementary to the results in Table 1.

Table 2. Runs test statistics and results for QoQ growth rates

Country	M5_P		Y1_P		Y2_P		Y3_P		Y5_P		L_P	
	R	N	R	N	R	N	R	N	R	N	R	N
AUS	46	90	49	88	43	84	47	80	34	72	61	92
AUT	31	57	21	54	26	50	22	46	20	38	35	58
BEL	39	84	46	81	43	77	42	73	32	65	46	85
BRA	18	44	24	42	21	38	18	34	12	26	25	46
CAN	46	90	44	88	48	84	45	80	31	72	42	92
CHE	44	90	47	88	42	84	39	80	33	72	51	92
CZE	28	56	27	54	24	50	22	46	23	38	27	58
DEU	38	90	50	88	49	84	41	80	35	72	47	92
DNK	44	90	51	88	48	84	43	80	42	72	50	92
ESP	42	91	41	88	33	84	38	80		72	37	92
FIN	46	90	46	88	45	84	42	80	37	72	46	92
FRA	34	91	32	88	40	84	37	80	31	72	38	92
GBR	45	91	37	88	40	84	29	80	26	72	40	92
HUN	28	49	23	47	18	43	20	39	15	31	27	51
IDN	31	68	37	65	33	61	31	57	29	49	35	69
IND	25	41	23	39	18	35	21	31	12	23	27	43
IRL	29	52	31	49	27	45	23	41	19	34	31	53
ISL	21	43	20	41	25	37	21	33	16	25	28	45
ITA	52	90	51	88	46	84	40	80	36	72	46	92
JPN	43	90	46	88	45	84	41	80	35	72	48	92
KOR	33	74	33	71	35	67	32	63	30	55	38	75
LUX	18	43	16	41	17	37	20	31	18	25	24	45
MEX	25	45	24	42	22	38	24	34	17	26	27	46
NLD	39	90	46	88	48	84	43	80		72	56	92
NOR	52	90	55	88	53	84	51	80		72	60	92
NZL	51	90	41	88	48	84	43	80	37	72	54	92
POL	20	43	24	41	19	37	15	33	11	25	28	45
PRT	36	86	49	84	47	80	38	76	40	68	47	88
SVK	16	48	24	46	22	42	18	38	18	30	24	50
SWE	23	43	21	41	20	37	17	33	11	25	21	45
TUR	20	43	16	41	17	37	16	33	12	25	20	45
USA	48	90	48	87	48	83	42	79	46	71	55	91
ZAF	35	62	29	60	35	56	28	52	23	44	34	64

Note: The runs test was not performed for Y5_P for the Netherlands, Norway and Spain because of a break in the series for this interval related to the provision of shorter time series for one or more specific time periods.

b) Relative size of revisions to GDP growth rates across countries: MAR and RMAR analysis

17. The mean absolute revision (MAR) to first published estimates of GDP QoQ (Figure 5) and YoY (Figure 6) growth rates allows to determine the size of the revisions, regardless of the sign. For both QoQ and YoY growth rates, the MARs reveal an upward trend in the revisions: the MAR increases the longer

the interval from the first published estimate. This is a logical consequence of the revision process because the longer the interval from the first published estimate, the more information is included and also the likelihood of changes in definitions and methodology becomes more apparent, which increases the likelihood of larger revisions.

18. Comparing the absolute average revisions of QoQ growth rates in Figure 5, the countries can roughly be divided into four groups. First, the smallest revisions (an average revision over the five intervals below 0.3 pp) are noted for Australia, Belgium, Canada, France, Germany, Italy, Korea, Poland, South Africa, Spain, Switzerland, the United Kingdom and the United States. A second group composed of Austria, Brazil, the Czech Republic, Denmark, Hungary, Indonesia, Japan, Mexico, the Netherlands, New Zealand, Norway and Portugal presents lower-medium size revisions (average revision between 0.3 pp and 0.5 pp) and a third group with Finland, the Slovak Republic and Sweden upper-medium size revisions (between 0.5 pp and 0.75 pp). The remaining five countries (Iceland, India, Ireland, Luxembourg and Turkey) record relatively high revisions, above 0.75 pp.

19. Considering YoY growth rates, Figure 6 shows a more balanced picture with smaller gaps across countries. According to this scale, the fourth group stated above with the highest QoQ revisions (Iceland, India, Ireland, Luxembourg and Turkey) is also the group of countries with the highest YoY revisions. Furthermore, several countries (Australia, Belgium, Canada, France, Germany, Korea, South Africa, Switzerland, the United Kingdom and the United States) that reported the smallest absolute average revisions from the QoQ growth perspective moved up to the group of lower-medium size revisions (i.e. average revision between 0.3 pp and 0.5 pp) when YoY growth rates are considered (between 0.3 pp and 0.5 pp).

Figure 5. MAR to first published estimates of QoQ growth rates for GDP

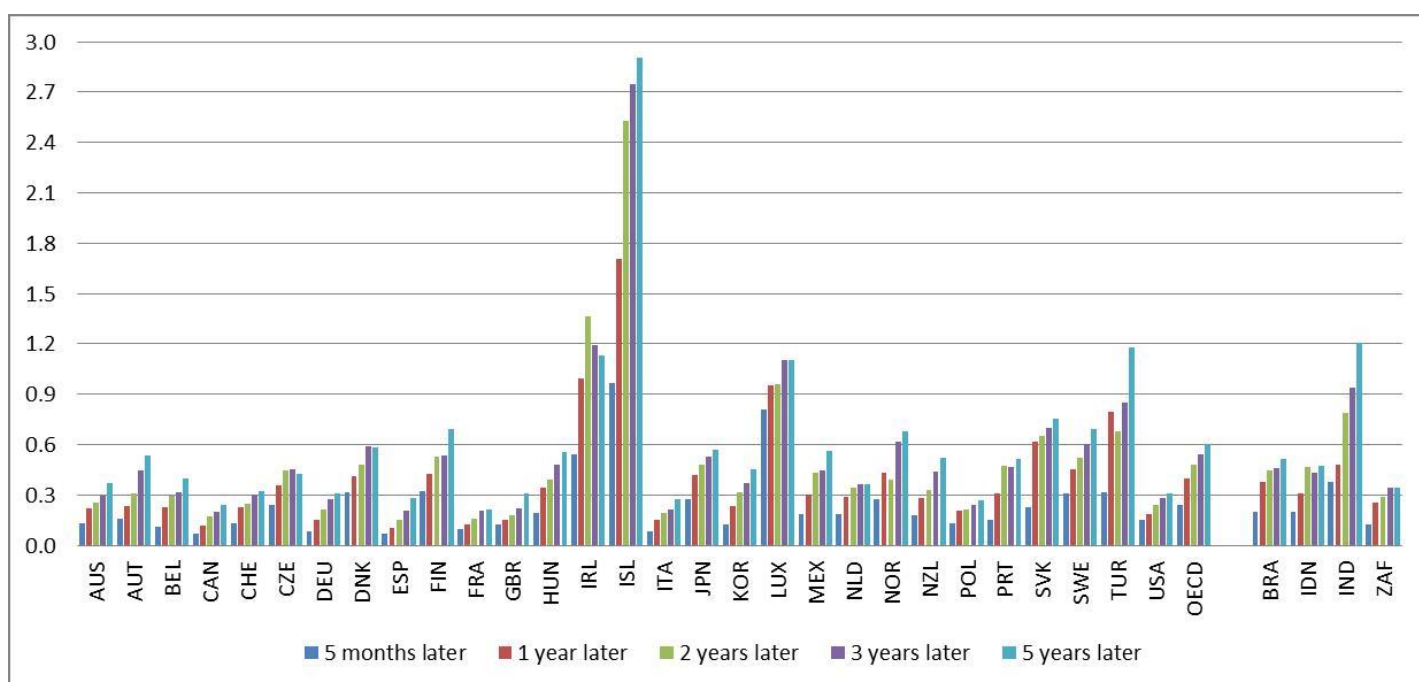
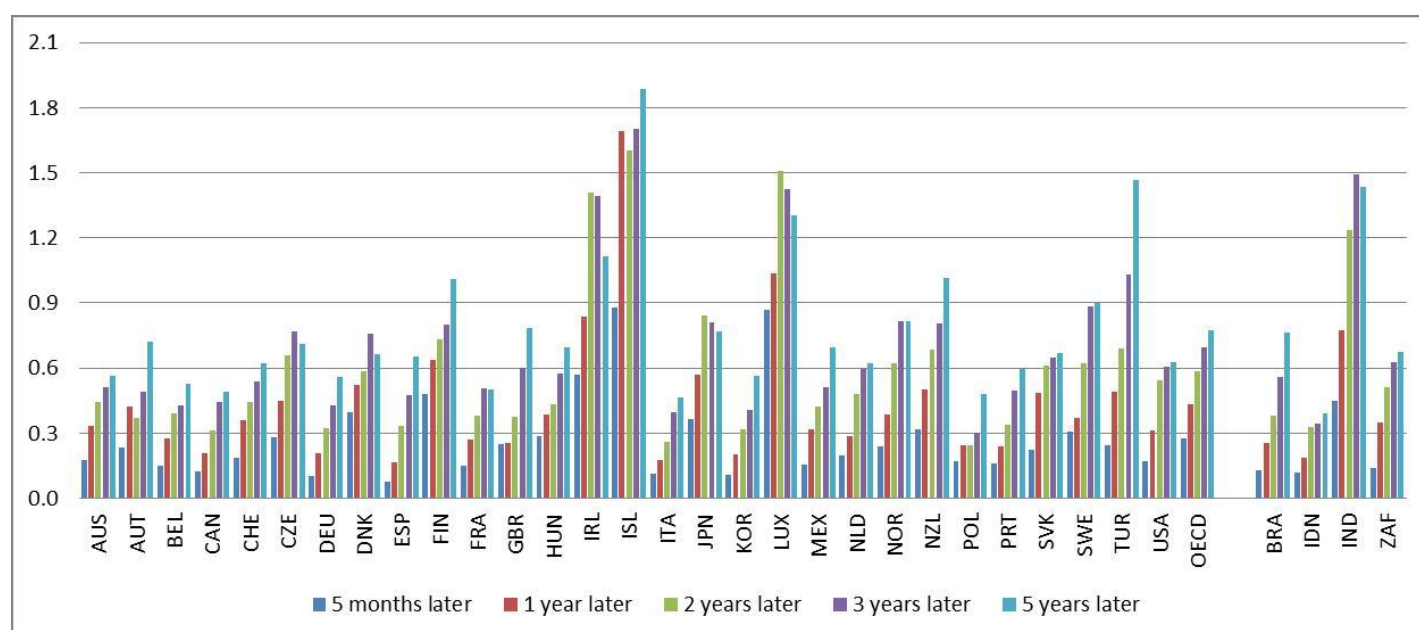


Figure 6. MAR to first published estimates of YoY growth rates for GDP



20. In order to take into account the average absolute size of the relevant growth rates over the period of analysis, the relative mean absolute revision (RMAR) can be used to compare the size of revisions across countries. Based on RMAR, Figure 7 (QoQ growth rates) shows a different picture compared with the one based on MAR in Figure 5.

21. A few countries move up from the low revision to the lower-medium revision group (Australia, Belgium, France, Germany, Italy, Switzerland, the United Kingdom and the United States), while some others (Austria, Denmark, Hungary, Norway and Portugal) move from the lower-medium to the upper-medium revision group. Vice versa, relatively smaller revisions can be observed for India, Ireland and Turkey (moving from the highest revision to the lower-medium or upper-medium revision groups).

22. When the absolute revision is adjusted for the size of QoQ growth, Canada, Korea, Poland and Spain are the four countries that record the smallest revisions (looking at the average across all intervals) while Iceland shows the highest RMAR, followed by Luxembourg.

23. Figure 8 shows the results for YoY growth rates. The size of revisions based on YoY growth rates is lower than those based on QoQ growth rates for all countries. The countries that record the highest relative mean absolute revisions are Iceland, Japan and Luxembourg.

Figure 7. RMAR to first published estimates of QoQ growth rates for GDP

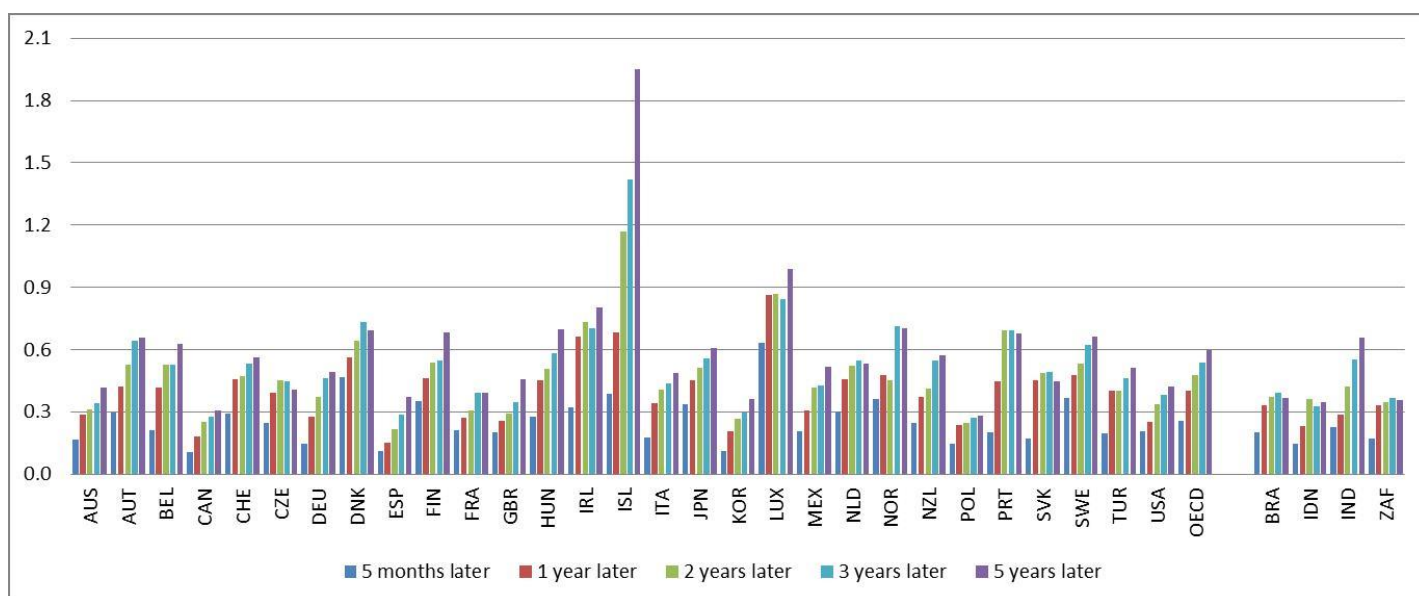
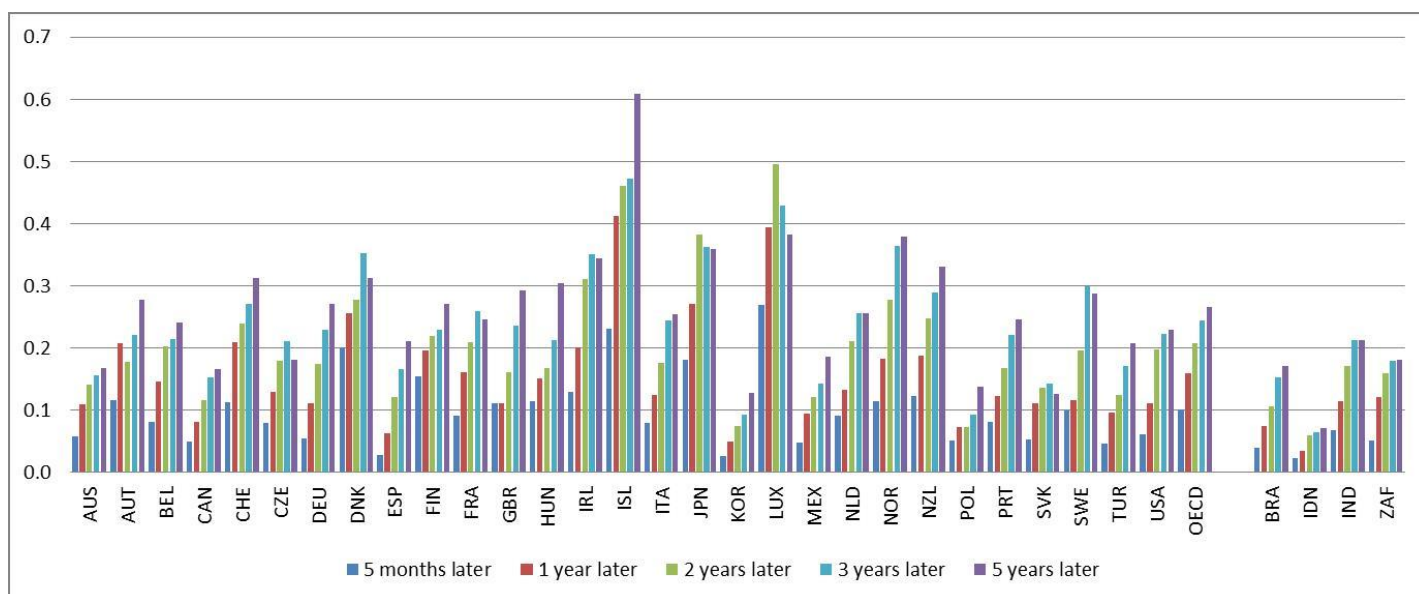


Figure 8. RMAR to first published estimates of YoY growth rates for GDP

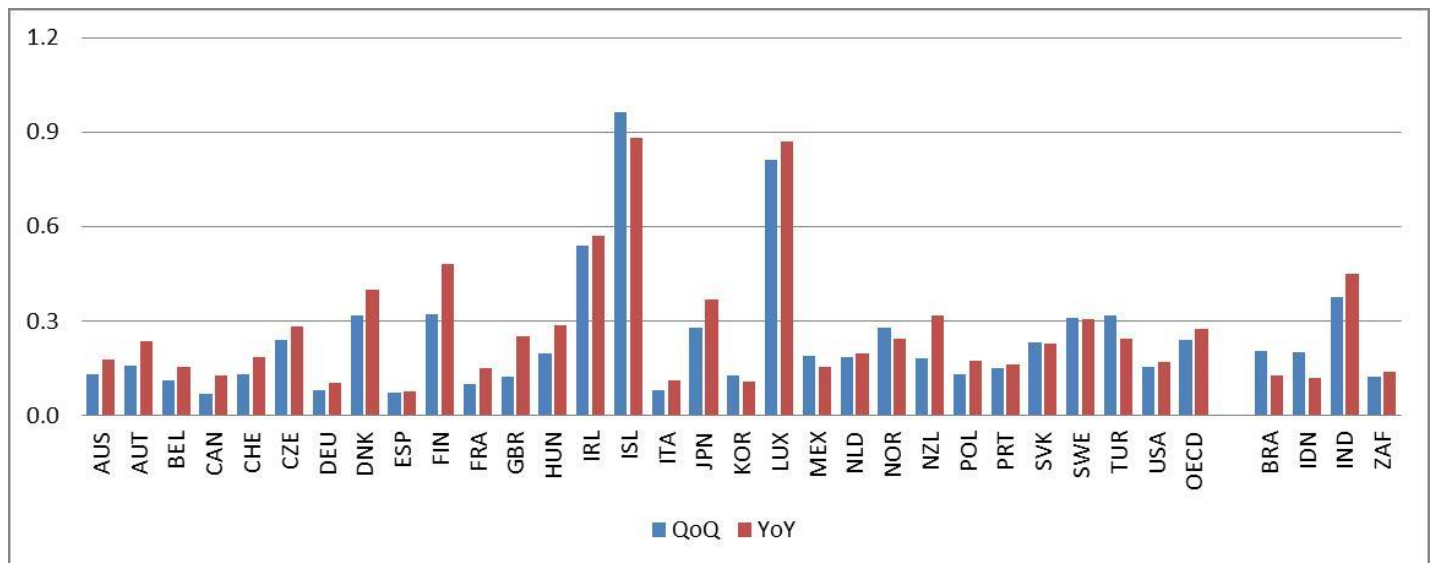


A comparison of short-term revisions for GDP QoQ and YoY growth rates

24. Focusing on short-term revisions based on the growth rates published 5 months after the preliminary estimates could give some information on the robustness of the early estimates. In that regard, it can be observed from Figure 5 to Figure 8 that the MAR for QoQ growth rates is lower than the MAR for YoY growth rates in most countries, but that the opposite holds in all countries when looking at results for RMAR. This means that when the size of growth rates is considered, YoY growth rates are prone to smaller revisions than QoQ in the short-term.

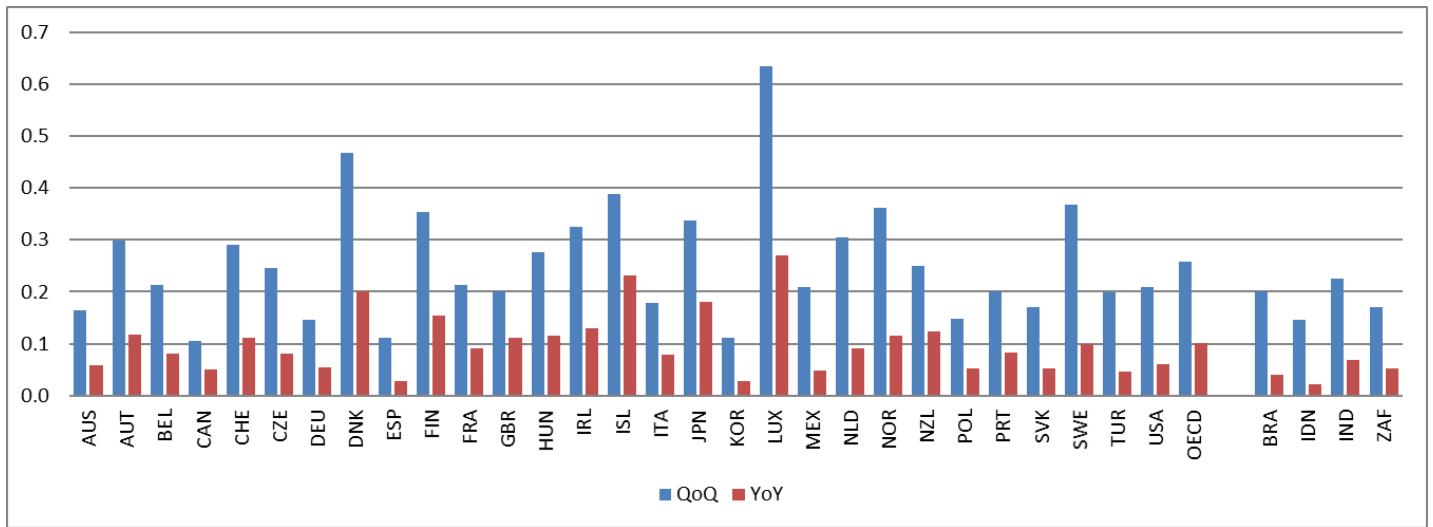
25. Although for estimates published 5 months after the preliminary estimates the positive and negative revisions balance out (on average) for a majority of countries (with the exception of six countries¹⁰), ten countries (Denmark, Finland, Iceland, India, Ireland, Luxembourg and Sweden for both QoQ and YoY growth rates, Turkey for QoQ growth rates and Japan and New Zealand for YoY growth rates only) have a MAR above 0.3 pp, revealing a lower robustness of early estimates compared to the other countries (see Figure 9). When taking into account the size of the growth rates, nine countries (Denmark, Finland, Iceland, Ireland, Japan, Luxembourg, the Netherlands, Norway and Sweden) record RMAR above 0.3 in the short-term for QoQ growth rates (see Figure 10). For YoY growth rates this is the case for none of the countries.

Figure 9. MAR five months after first published estimates for GDP QoQ and YoY growth rates



¹⁰ Table 1 showed that Australia, Denmark, Indonesia, Ireland, the Netherlands and South Africa report mean revisions significantly different from zero at the 5% significance level for either QoQ or YoY growth rates or for both.

Figure 10. RMAR five months after first published estimates for GDP QoQ and YoY growth rates



c) Size of the GDP revisions: an assessment over time

26. In this section, it is examined whether revisions are generally becoming smaller over time. For this purpose, the MAR indicator for GDP QoQ growth rates has been analysed for four time periods¹¹, respectively five months and one year after the first published estimate (see Figure 11 and Figure 12).

27. Only a few countries have revisions becoming smaller over time. It is the case for Australia along the four time periods for M5_P, and for the Netherlands and Norway for Y1_P. Furthermore, it is the case for Indonesia and South Africa for both QoQ and YoY growth rates along the three time periods for which information is available. On the contrary, revisions have become larger for New Zealand along the four time periods (M5_P) and for Ireland along the three time periods available (Y1_P). For the other countries, patterns are less distinct (e.g. not strictly increasing/decreasing).

28. It has to be borne in mind that sometimes methodological changes may explain larger revisions for some specific time periods. The implementation of the 2008 SNA, for example, occurred in the last time period (2013Q1-2018Q1) in most countries¹², which may explain relatively higher MARs in countries such as Ireland, Luxembourg, New Zealand, the Netherlands, Spain, Turkey and the United States in this last time period¹³. Similarly, Canada already moved to the 2008 SNA with the release of its results for 2012Q4, which may explain the relatively higher MARs in the third period. More information would be needed on the quantitative impacts of these methodological revisions to isolate their impact in the revision analysis. In that regard, it has to be borne in mind that the changeover to a new SNA may have a different impact on GDP growth rates depending on the country¹⁴.

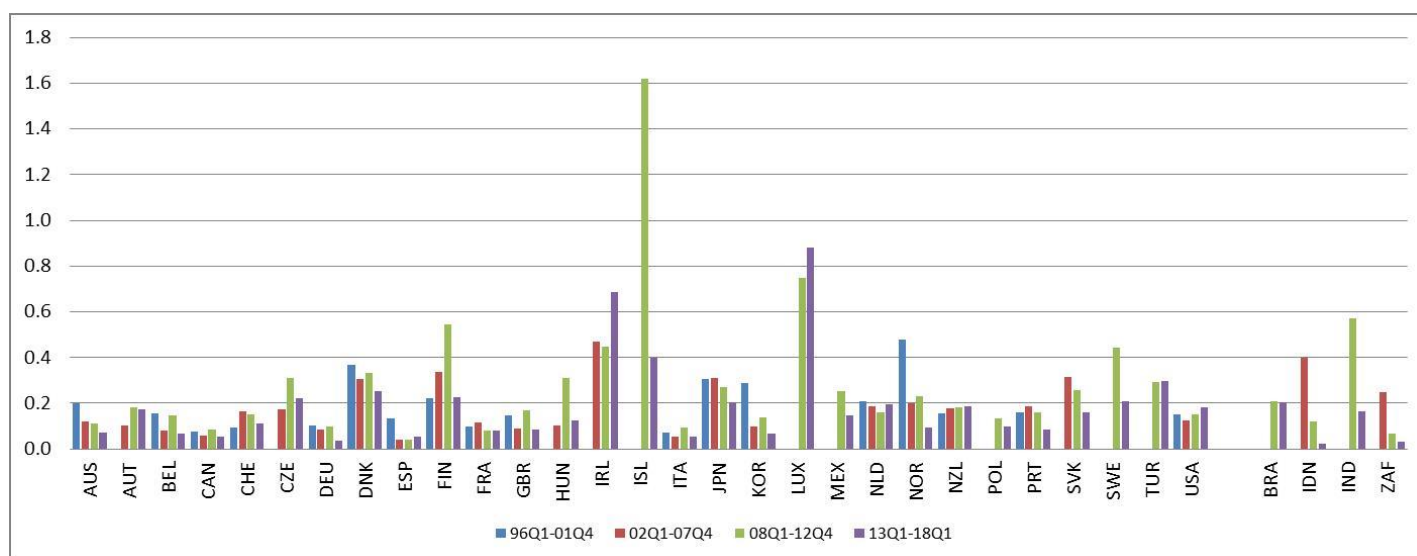
¹¹ 1996Q1-2001Q4; 2002Q1-2007Q4; 2008Q1-2012Q4; and 2013Q1-2018Q1. For some countries, some of the time periods may be missing depending on data availability. See Annex - Table 6.

¹² More precisely with the release of the reference quarter 2014Q2 for most European countries.

¹³ Although it should be borne in mind that the impact will be limited to only a couple of quarters as in the analysis as described here, only revisions five months and one year after the reference period are taken into consideration.

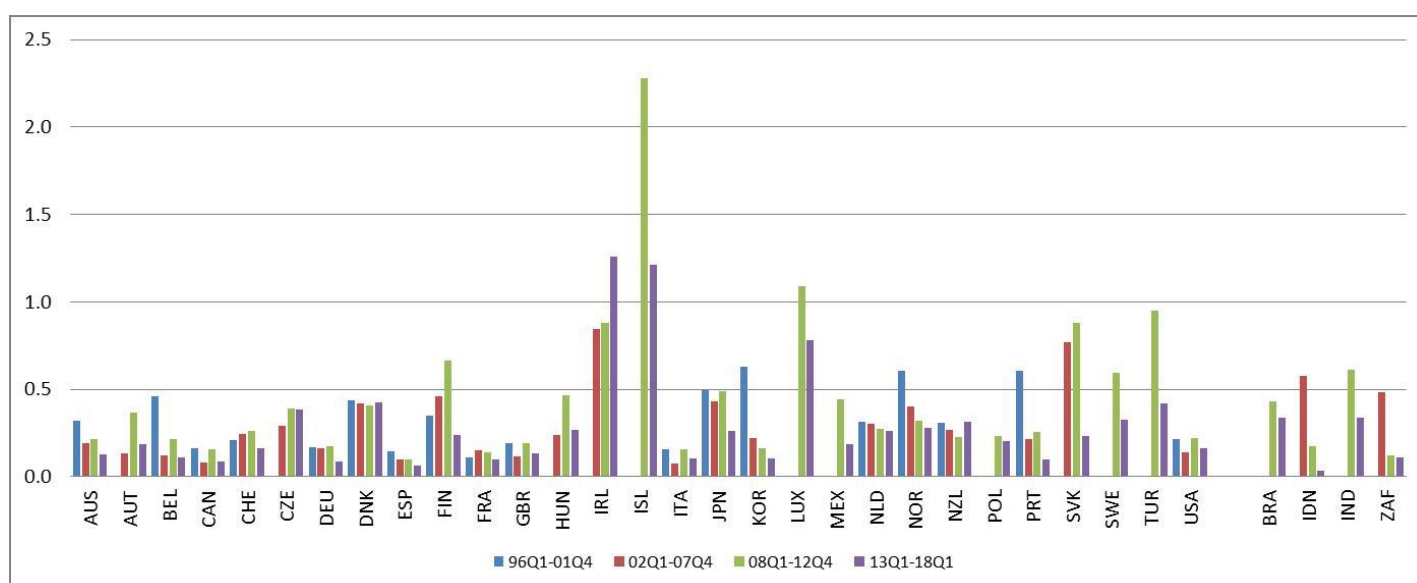
¹⁴ For more information on the impact of the changeover to the 2008 SNA, please see: <http://www.oecd.org/sdd/na/new-standards-for-compiling-national-accounts-SNA2008-OECDSEB20.pdf>

Figure 11. MAR five months after first published QoQ growth rates for GDP



Note: Earlier time periods may be missing if the number of observations is less than 8 quarters.

Figure 12. MAR one year after first published QoQ growth rates for GDP



Note: Earlier time periods may be missing if the number of observations is less than 8 quarters.

29. The time periods breakdown can also be used for another purpose: catching the trends on the size of revisions in a period of financial turmoil, such as the 2008 global financial crisis. To do so, the two intermediate intervals before and after the crisis (i.e. 2002Q1-2007Q4 and 2008Q1-2012Q4) can be compared to determine whether revisions are influenced by the business cycle. It turns out that revisions were larger in the period just after the crisis for fifteen countries for M5_P and seventeen countries for

Y1_P (out of the twenty-five countries for which data is available for both periods), in line with earlier conclusions of Shrestha and Marini (2013).

d) GDP direction of change and acceleration vs. deceleration

30. A first element of robustness of early estimates is demonstrated by the correctness of the direction of change of GDP (Table 3). Indeed, for the same quarter, it is important that GDP initial growth rates estimated at two different intervals (for example, between the first published estimate and the estimate published five months later) have the same sign.

31. Generally, the average percentage of times indicating the same direction of growth decreases for both QoQ and YoY growth rates with the increase of the interval after the first published estimate (except for L_P). At five months after the first estimates, OECD countries detect the same direction of growth in 91.9% of the cases for QoQ growth estimates and in 97.7% for YoY growth estimates. These percentages decrease to respectively 81.4% and 92.5% at five years after the first estimate. The four OECD key partners perform slightly better at all time intervals.

32. Australia is the country that performs the best as its percentages of time indicating the same directions are 98.8% or above for both QoQ and YoY for every interval. In this respect, it can be noted that Australia is also among the countries recording the lowest number of negative GDP growth rates over the period covered, just after Poland. On the contrary, Austria, Denmark, Finland, Iceland, Ireland, Luxembourg, Norway, Sweden and Switzerland record percentages below OECD average at all intervals for QoQ growth rates, and Ireland, Japan, Luxembourg and Switzerland for YoY growth rates. As there is a direct link with the number of quarters in which negative growths is reported, this has to be taken into account when analysing the frequency with which countries report direction changes. When this frequency is taken into account, Austria and Switzerland (for QoQ growth rates) and Luxembourg and Sweden (for YoY growth rates) are the countries that record a relatively higher number of changes in direction.

Table 3. Percentage of times indicating same direction of growth (QoQ and YoY)

Percentage of times indicating same direction of growth (QoQ)							Percentage of times indicating same direction of growth (YoY)						
Country	M5_P	Y1_P	Y2_P	Y3_P	Y5_P	L_P	Country	M5_P	Y1_P	Y2_P	Y3_P	Y5_P	L_P
AUS	100.0	98.9	100.0	98.8	100.0	100.0	AUS	100.0	100.0	100.0	100.0	100.0	100.0
AUT	86.0	83.3	84.0	76.1	76.3	79.3	AUT	98.1	94.1	93.6	93.0	91.4	90.9
BEL	92.9	91.4	79.2	82.2	76.9	85.9	BEL	98.8	98.7	95.9	97.1	93.5	93.9
CAN	98.9	98.9	97.6	98.8	95.8	95.7	CAN	100.0	100.0	100.0	100.0	98.6	98.9
CHE	90.0	84.1	85.7	82.5	79.2	78.3	CHE	95.4	92.9	90.1	88.3	82.6	85.4
CZE	91.1	85.2	88.0	89.1	86.8	86.2	CZE	98.1	100.0	100.0	97.7	97.1	96.4
DEU	97.8	95.5	88.1	86.3	84.7	84.8	DEU	98.9	100.0	98.8	96.1	95.7	96.6
DNK	86.7	79.5	78.6	71.3	75.0	73.9	DNK	94.3	96.5	91.4	92.2	94.2	93.3
ESP	98.9	96.6	95.2	93.8	90.3	93.5	ESP	100.0	96.5	97.5	97.4	91.3	94.4
FIN	84.4	81.8	78.6	78.8	76.4	76.1	FIN	92.0	90.6	88.9	89.6	92.8	87.6
FRA	95.6	88.6	92.9	88.8	87.5	91.3	FRA	97.7	96.5	95.1	94.8	94.2	95.5
GBR	97.8	96.6	96.4	95.0	91.7	93.5	GBR	96.6	96.5	93.8	93.5	92.8	94.4
HUN	91.8	93.6	86.0	84.6	80.6	88.2	HUN	100.0	100.0	100.0	97.2	85.7	95.8
IRL	82.7	77.6	71.1	75.6	67.6	77.4	IRL	89.8	82.6	78.6	76.3	71.0	76.0
ISL	88.4	78.0	62.2	60.6	44.0	60.0	ISL	95.0	81.6	82.4	90.0	95.5	92.9
ITA	93.3	89.8	92.9	87.5	90.3	79.3	ITA	100.0	97.6	95.1	89.6	92.8	87.6
JPN	87.8	85.2	84.5	82.5	81.9	82.6	JPN	93.1	91.8	85.2	81.8	84.1	85.4
KOR	100.0	100.0	97.0	98.4	98.2	98.7	KOR	100.0	100.0	100.0	100.0	100.0	100.0
LUX	67.4	53.7	56.8	51.6	44.0	64.4	LUX	95.0	89.5	82.4	85.7	90.9	90.5
MEX	95.6	92.9	92.1	88.2	92.3	91.3	MEX	100.0	100.0	100.0	100.0	100.0	100.0
NLD	90.0	87.5	88.1	83.8	75.0	84.8	NLD	98.9	97.6	96.3	92.2	82.6	93.3
NOR	87.8	85.2	83.3	76.3	76.4	81.5	NOR	95.4	96.5	93.8	89.6	84.1	93.3
NZL	94.4	90.9	91.7	85.0	86.1	88.0	NZL	100.0	95.3	93.8	92.2	92.8	93.3
POL	100.0	92.7	97.3	90.9	88.0	91.1	POL	100.0	100.0	100.0	93.3	100.0	97.6
PRT	95.3	86.9	73.8	77.6	80.9	83.0	PRT	100.0	97.5	96.1	95.9	96.9	97.6
SVK	91.7	91.3	85.7	81.6	86.7	92.0	SVK	100.0	100.0	100.0	100.0	100.0	100.0
SWE	88.4	85.4	78.4	69.7	72.0	82.2	SWE	97.5	100.0	97.1	90.0	86.4	90.5
TUR	93.0	87.8	89.2	84.8	84.0	91.1	TUR	97.5	97.4	100.0	100.0	100.0	97.6
USA	97.8	96.6	94.0	92.4	93.0	94.5	USA	100.0	98.8	93.8	97.4	97.1	97.7
OECD	91.9	88.1	85.8	83.2	81.4	85.1	OECD	97.7	96.2	94.5	93.5	92.5	93.7
BRA	95.5	97.6	89.5	85.3	92.3	91.3	BRA	100.0	100.0	100.0	100.0	100.0	97.7
IDN	97.1	95.4	93.4	93.0	93.9	91.3	IDN	100.0	100.0	100.0	100.0	100.0	100.0
IND	95.1	94.9	94.3	93.5	91.3	95.3	IND	100.0	100.0	100.0	100.0	95.0	100.0
ZAF	96.8	90.0	94.6	94.2	95.5	93.8	ZAF	100.0	100.0	100.0	100.0	100.0	100.0

33. A second element of robustness of early estimates can be assessed by looking at the correctness of the direction of change in the growth rate, i.e. by looking at whether the direction of change is accelerating or decelerating between two quarters (Table 4).

34. The average percentage indicating correctly whether growth is accelerating or decelerating also decreases for both QoQ and YoY growth rates with the increase of the interval after the first published estimate (except for L_P). Looking at QoQ growth rates, the four countries that perform best are France,

Germany, Italy and Korea, while Austria, Brazil, India, the Slovak Republic and Switzerland record the lowest percentages (on average). For YoY the picture slightly differs, with Brazil, France, Korea and Sweden performing best, and Austria, Iceland, India, Luxembourg and the Slovak Republic recording the lowest percentages on average.

Table 4. Percentage of times indicating Acceleration/Deceleration (QoQ and YoY)

Percentage of times indicating Acceleration or Deceleration (QoQ)							Percentage of times indicating Acceleration or Deceleration (YoY)						
Country	M5_P	Y1_P	Y2_P	Y3_P	Y5_P	L_P	Country	M5_P	Y1_P	Y2_P	Y3_P	Y5_P	L_P
AUS	87.6	82.8	71.1	74.7	67.6	63.7	AUS	86.0	78.6	78.8	80.3	72.1	72.7
AUT	71.4	64.2	57.1	57.8	54.1	47.4	AUT	77.4	64.0	76.1	73.8	73.5	72.2
BEL	86.7	72.5	72.4	68.1	65.6	71.4	BEL	85.0	87.0	82.2	85.5	82.0	84.0
CAN	94.4	85.1	78.3	77.2	76.1	79.1	CAN	91.9	89.3	88.8	86.8	83.8	87.5
CHE	75.3	58.6	62.7	55.7	60.6	54.9	CHE	88.4	83.3	87.5	84.2	86.8	75.0
CZE	74.5	66.0	57.1	68.9	62.2	68.4	CZE	84.6	82.0	80.4	76.2	76.5	85.2
DEU	93.3	88.5	79.5	74.7	77.5	79.1	DEU	91.9	86.9	88.8	85.5	80.9	80.7
DNK	88.8	83.9	71.1	72.2	70.4	67.0	DNK	75.6	76.2	73.8	71.1	77.9	69.3
ESP	82.2	71.3	79.5	69.6	60.6	63.7	ESP	85.1	83.3	76.3	75.0	66.2	75.0
FIN	88.8	75.9	75.9	72.2	67.6	73.6	FIN	81.4	78.6	73.8	76.3	72.1	64.8
FRA	92.2	86.2	78.3	78.5	78.9	78.0	FRA	89.7	88.1	86.3	86.8	94.1	85.2
GBR	81.1	75.9	73.5	78.5	77.5	70.3	GBR	79.3	84.5	78.8	77.6	72.1	62.5
HUN	89.6	80.4	73.8	68.4	70.0	70.0	HUN	80.0	79.1	74.4	80.0	77.8	83.0
IRL	88.2	75.0	77.3	77.5	75.8	71.2	IRL	79.2	73.3	73.2	78.4	70.0	59.2
ISL	92.9	67.5	69.4	68.8	50.0	68.2	ISL	84.6	70.3	72.7	58.6	66.7	70.7
ITA	92.1	87.4	85.5	82.3	70.4	63.7	ITA	88.4	83.3	82.5	81.6	80.9	80.7
JPN	86.5	81.6	77.1	73.4	69.0	73.6	JPN	81.4	75.0	75.0	81.6	76.5	73.9
KOR	94.5	88.6	81.8	77.4	77.8	75.7	KOR	94.3	94.0	90.5	86.4	80.4	84.5
LUX	71.4	62.5	72.2	63.3	66.7	77.3	LUX	71.8	59.5	69.7	63.0	81.0	73.2
MEX	88.6	85.4	78.4	78.8	60.0	77.8	MEX	95.1	78.9	70.6	83.3	77.3	83.3
NLD	86.5	75.9	75.9	75.9	70.4	69.2	NLD	89.5	85.7	77.5	75.0	70.6	76.1
NOR	89.9	86.2	84.3	73.4	69.0	81.3	NOR	89.5	85.7	73.8	67.1	67.6	80.7
NZL	83.1	80.5	77.1	70.9	71.8	70.3	NZL	81.4	77.4	73.8	78.9	76.5	78.4
POL	78.6	82.5	80.6	75.0	66.7	59.1	POL	84.6	89.2	84.8	93.1	76.2	75.6
PRT	89.4	83.1	74.7	76.0	74.6	70.1	PRT	92.7	90.0	80.3	80.6	78.1	79.8
SVK	68.1	62.2	51.2	51.4	51.7	38.8	SVK	77.3	78.6	63.2	67.6	73.1	73.9
SWE	81.0	77.5	72.2	75.0	66.7	72.7	SWE	82.1	86.5	84.8	89.7	100.0	80.5
TUR	81.0	80.0	80.6	84.4	83.3	81.8	TUR	92.3	89.2	78.8	89.7	90.5	75.6
USA	88.8	82.6	76.8	75.6	70.0	70.0	USA	80.2	77.1	78.5	76.0	80.6	78.2
OECD	85.1	77.6	74.0	72.3	68.4	69.2	OECD	84.8	81.2	78.5	79.0	78.0	76.6
BRA	90.7	65.9	59.5	48.5	52.0	60.0	BRA	90.0	94.7	91.2	83.3	90.9	88.1
IDN	85.1	79.7	66.7	64.3	62.5	63.2	IDN	89.1	82.0	70.2	69.8	64.4	72.3
IND	82.5	65.8	44.1	40.0	54.5	52.4	IND	86.5	82.9	67.7	59.3	63.2	66.7
ZAF	82.0	76.3	81.8	72.5	62.8	73.0	ZAF	82.8	80.4	88.5	81.3	85.0	81.7

e) Regression against the growth rate and the change in growth rate

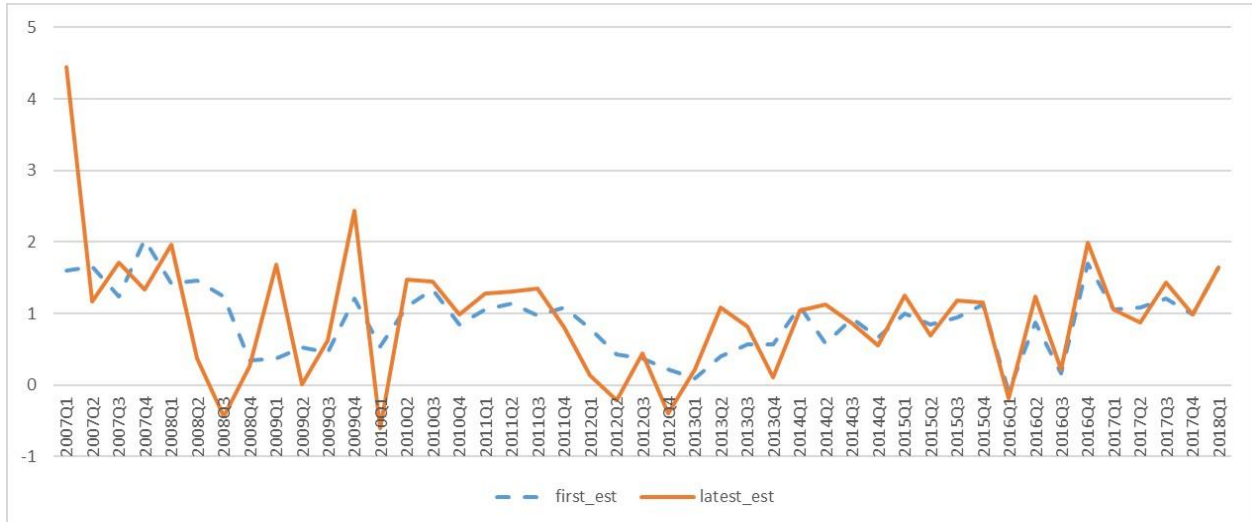
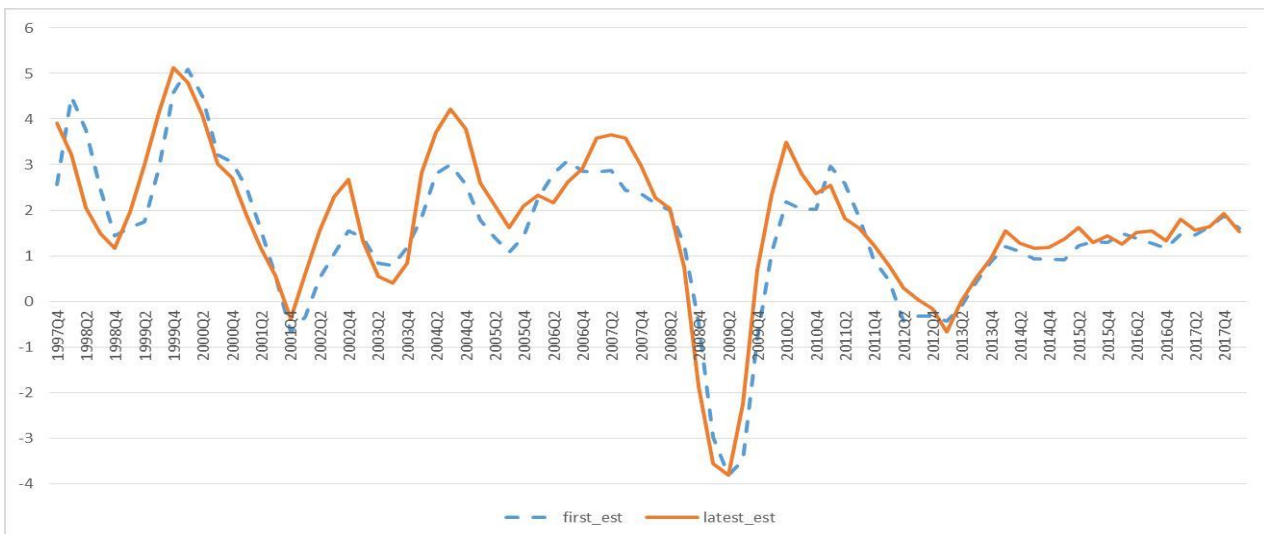
35. It is interesting to assess whether the revisions are correlated with the growth rates and/or the directions of change of the growth rates, which may point to respectively a potential dampening of first estimates of GDP growth rates and to a potential delay in capturing turning points in the business cycle.

36. Table 5 reports the regression coefficients with revisions as the dependent variable and GDP growth rates, focusing on QoQ and YoY respectively, as the independent variable. All estimated coefficients are significant at the 1% level, except those in italic which are only statistically significant at the 10% level. For five countries (India, Indonesia, Luxembourg, Poland and Switzerland), the regression coefficient β is above 0.5 for QoQ growth rates which means that when there is a 1 pp increase in QoQ growth rates, the revisions will increase by more than 0.5 pp. Furthermore, Denmark, New Zealand and Norway also report relatively high regression coefficients. Visually, this will translate into a GDP growth series being more flattened for the first estimates compared to the latest estimates (see results for Poland as an example in Figure 13). For the YoY growth rates, the regression coefficients are much smaller, implying that there is not a strong bias in the early estimate in relation to later growth rates for most of countries.

Table 5. Estimated coefficients from the regressions

R = β L			R = β A/D_L		
Country	QoQ	YoY	Country	QoQ	YoY
AUS	0.4560	0.2055	AUS	0.2892	0.2068
AUT	0.4493	0.1689	AUT	0.4951	0.4018
BEL	0.3127	0.1167	BEL	0.4284	0.5187
BRA	0.2323	0.0562	BRA	0.1284	0.0747
CAN	0.2774	0.1676	CAN	0.2346	0.0642
CHE	0.6235	0.3071	CHE	0.5143	0.3503
CZE	0.1507	0.1099	CZE	0.0303	0.2108
DEU	0.2512	0.1725	DEU	0.1295	0.1105
DNK	0.4848	0.1421	DNK	0.3221	0.2108
ESP	0.2368	0.2235	ESP	0.3600	0.3016
FIN	0.4386	0.1373	FIN	0.3185	0.2261
FRA	0.2221	0.1911	FRA	0.0037	0.0907
GBR	0.4110	0.2278	GBR	0.3984	0.6046
HUN	0.3955	0.0746	HUN	0.4264	0.2573
IDN	0.5085	-0.0870	IDN	0.0553	0.2620
IND	0.5847	0.2866	IND	0.4134	0.3261
IRL	0.3856	0.1050	IRL	0.2759	0.3735
ISL	0.4106	0.2260	ISL	0.2482	0.0746
ITA	0.3821	0.2080	ITA	0.3117	0.2502
JPN	0.2353	-0.0510	JPN	0.2015	-0.0158
KOR	-0.0498	-0.0387	KOR	-0.0140	-0.0683
LUX	0.5538	0.3065	LUX	0.3060	0.2717
MEX	-0.0312	-0.1745	MEX	-0.0080	-0.0667
NLD	0.2093	0.0979	NLD	0.2199	0.0461
NOR	0.4851	0.2532	NOR	0.2869	0.1960
NZL	0.4917	0.2299	NZL	0.2875	0.2993
POL	0.6717	0.2272	POL	0.3544	0.3937
PRT	0.2340	0.1814	PRT	0.2545	0.1670
SVK	0.0734	0.0496	SVK	0.0647	0.1585
SWE	0.4094	0.0875	SWE	0.2576	0.1925
TUR	0.3154	0.0974	TUR	0.2060	-0.0533
USA	0.3718	0.2067	USA	0.3508	0.2647
ZAF	0.2127	0.1077	ZAF	0.2249	0.1410

Note: $0.3 < \beta < 0.4$, $0.4 \leq \beta < 0.5$ and $\beta \geq 0.5$

Figure 13. QoQ GDP growth rates for Poland**Figure 14. YoY GDP growth rates for Belgium**

37. Table 5 reports the regression coefficients with revisions as the dependent variable and change in GDP growth rates (i.e. acceleration and deceleration), again focusing on QoQ and YoY respectively, as the independent variable. In this case, a few countries report coefficients above 0.5. For QoQ growth rates this is the case for Switzerland, whereas for YoY growth rates this is the case of Belgium and the United Kingdom. Visually, this will translate into a GDP growth series for the first estimates lagging behind the growth series for the final estimates. Figure 14 shows the example for Belgium on the basis of YoY growth rates. It can be observed that for some time periods there seems to be a delay in picking up turning points in the business cycle, particularly in the early time periods. Conversely, the relationships between revisions

and acceleration/deceleration of the final estimates are not very strong in countries such as France, Korea and Mexico, for either QoQ or YoY growth rates. Their estimated coefficients are close to zero.

B. Major expenditure components of GDP

38. So far, the focus of the analysis has been on GDP growth estimates. In order to provide a more comprehensive picture, this section shows the results for GDP growth broken down by its major expenditure components: Private Consumption Expenditure (PCE), Government Consumption Expenditure (GCE), Gross Fixed Capital Formation (GFCF), Exports and Imports¹⁵. Changes in inventories are excluded from this analysis as this information is not available in the OECD MEI Revisions Analysis dataset. Countries with MRs that are statistically significant may derive valuable information from looking at the revisions of these components. However, also for countries with low MRs for GDP growth, it may be interesting to take note of the revisions of these components. As revisions of the components tend to offset each other, the MR of GDP growth can be low, whereas the MRs for the growth rates of the components may still be quite substantial. Furthermore, the expenditure components also are very important economic indicators in themselves.

39. The magnitude of the various components and their shares in GDP may differ across countries. In some countries trade flows constitute very important components, whereas in other countries GCE may be relatively high. Therefore, if one takes a look at the relation between the revisions of the growth rates of the components and the revisions of GDP growth, this has to be borne in mind. For that reason, it may also not be very useful to look at RMAR of the components, as this indicator mainly focuses on the relative robustness of the component itself. A component may have a high RMAR, but if its weight is small in comparison to other components it may be less relevant when looking at it in relation to the revisions of GDP growth. If one wants to analyse how the revisions of the growth rates of these components relate to the revisions of GDP growth, it is best to look at their MRs and their MARs. In contrast, if one wants to look at the robustness of the components itself, it is best to look at the RMAR and its statistical significance. For the purpose of this study, the latter has not been done.

40. Two other points need to be mentioned before presenting the results. As GDP can be derived in three different ways (i.e. output approach, final demand/expenditure approach and income approach), the breakdown into expenditure components is only one way to attain more detailed information on GDP revisions. Looking at output and value added by industry or looking at the revisions of the main income components may also provide interesting information in this respect. Secondly, one must bear in mind that there is no directional link between these components and GDP. As a consequence, no conclusions can be drawn regarding causal effects. It may be the case that GDP growth is being revised because of an adjustment in the data source on imports, but it can also be the case that the imports are being revised because of a revision in GDP growth due to an adjustment of intermediate consumption for one of the major industries in a country (for example due to a correction in the survey for one of the major companies). More information is needed on the way countries estimate GDP growth rates to make a proper assessment of possible causal effects. For the purpose of this exercise, the analysis only focuses on detecting possible relations between revision of growth rates in GDP and those in the expenditure components.

¹⁵ Please note that Brazil, India and Indonesia are not included in the analysis because of lack of sufficiently long time series for the relevant components. For the same reason, information on PCE is missing for South Africa.

a) *Mean revision and statistical significance*

41. Figure 15 to Figure 19 show the mean revisions for PCE, GCE, GFCF, exports and imports for QoQ growth rates. As expenditure components of GDP the revisions for these components can be related to the mean revisions of GDP growth rates as presented in Figure 3. However, in analysing this relation, it has to be borne in mind that the various components may have different weights in GDP. The results presented here concern the unweighted revision results for the individual components¹⁶. Turkey was the country with the highest mean revision amplitudes for GDP. When the components of GDP are considered, it can be seen that the major revisions of GDP growth rates three and five years after the first estimates seem closely related to revisions in growth rates of GFCF (+0.6 pp in each interval). On the other hand, imports were also revised upwards significantly (+0.8 pp) five years after the first estimates, which may have largely cancelled out the impact of the GFCF revision as both components are of similar size and imports negatively contribute to GDP. Furthermore, revisions of Turkish PCE, while smaller compared to the revisions of GFCF and imports, also seem to correlate with GDP revisions, as this component has a much larger weight in GDP than the other two components (its size being more than 60% of GDP).

42. It can be observed that for a significant number of countries GFCF is the component subject to the largest revisions, mostly upwards. Ten countries (Australia, Denmark, France, Iceland, Ireland, Italy, Korea, the Netherlands, Turkey and the United Kingdom) report their largest mean revisions for this item. It depends on its weight in GDP how this correlates with the GDP revisions. The revisions are particularly large for Ireland, which first reports negative mean revisions for GFCF five months after the first published estimates, but then records large positive mean revisions as of two years after the first published estimates. Table 11 in the Annex also shows that the revisions to YoY growth rates for GFCG are statistically significant at the 1% level. This table also shows that revisions are significant at the 1% level for the United Kingdom for the QoQ growth rates for several time periods.

43. Some other observations can be drawn from the figures:

- When looking at the various components of GDP, the revisions for PCE are lowest on average. Half of the countries show upward revisions, whereas the other half record downward revisions. Iceland and Ireland, the two countries reporting the highest mean revisions to GDP growth rates after Turkey, record the largest MR for QoQ growth rates for PCE, with similar amplitude but opposite signs (see Figure 15); while Iceland's preliminary estimates of PCE tend to overestimate on average, Ireland's results seem to underestimate. Furthermore, several countries record statistically significant revisions for PCE. This is the case for Germany, Ireland, Korea, Luxembourg, the Netherlands and Portugal at the 1% level for some of the time periods, and for Canada and the Czech Republic at the 5% level (see Annex - Table 9).
- In most countries, MRs for GCE are somewhat in the middle when compared to those for the other components. However, the revisions tend to be high for Hungary, Iceland, Luxembourg and Poland (see Figure 16). Furthermore, it can be noted that growth rates for GCE are mostly revised upwards across countries. Twenty-three out of the thirty countries record upward revisions on average. The same holds for exports. Denmark, Luxembourg, Mexico and Sweden report revisions that are statistically significant at the 1% level for this item for some of the time periods (see Annex - Table 10).
- As mentioned before, gross fixed capital formation (GFCF) is an item that is subject to major revisions over time for many countries (see Figure 17). Especially, Iceland, Ireland, Luxembourg, Poland, Turkey and the United Kingdom report high MRs for this item.

¹⁶ Because data in the OECD MEI_ARCHIVE dataset is not available in current prices, it was not possible to compile the relevant weights of the GDP components.

- As can be seen in Figure 18 and Figure 19, most trade flows are revised upwards over time, for some countries quite substantially. Particularly Belgium, Finland, Iceland, Ireland, Luxembourg, Mexico, Poland, South Africa, Switzerland, Turkey and the United Kingdom record large revisions for their exports, their imports or both. When both flows are equally adjusted this will not affect the trade balance. However, when the revisions differ in size, this has an impact on the trade balance and therefore may affect revisions of GDP growth. For a lot of countries the revisions turn out to be statistically significant at the 1% level for some of the time periods (see Table 12 and Table 13 in the Annex). For Belgium, Finland, the Netherlands, Switzerland, Turkey and the United Kingdom this is the case for both imports and exports, whereas for Germany and Poland it only applies to exports and for the Czech Republic, Luxembourg, Portugal and Sweden to imports.

Figure 15. Mean Revision to first published estimates of QoQ growth rates for PCE

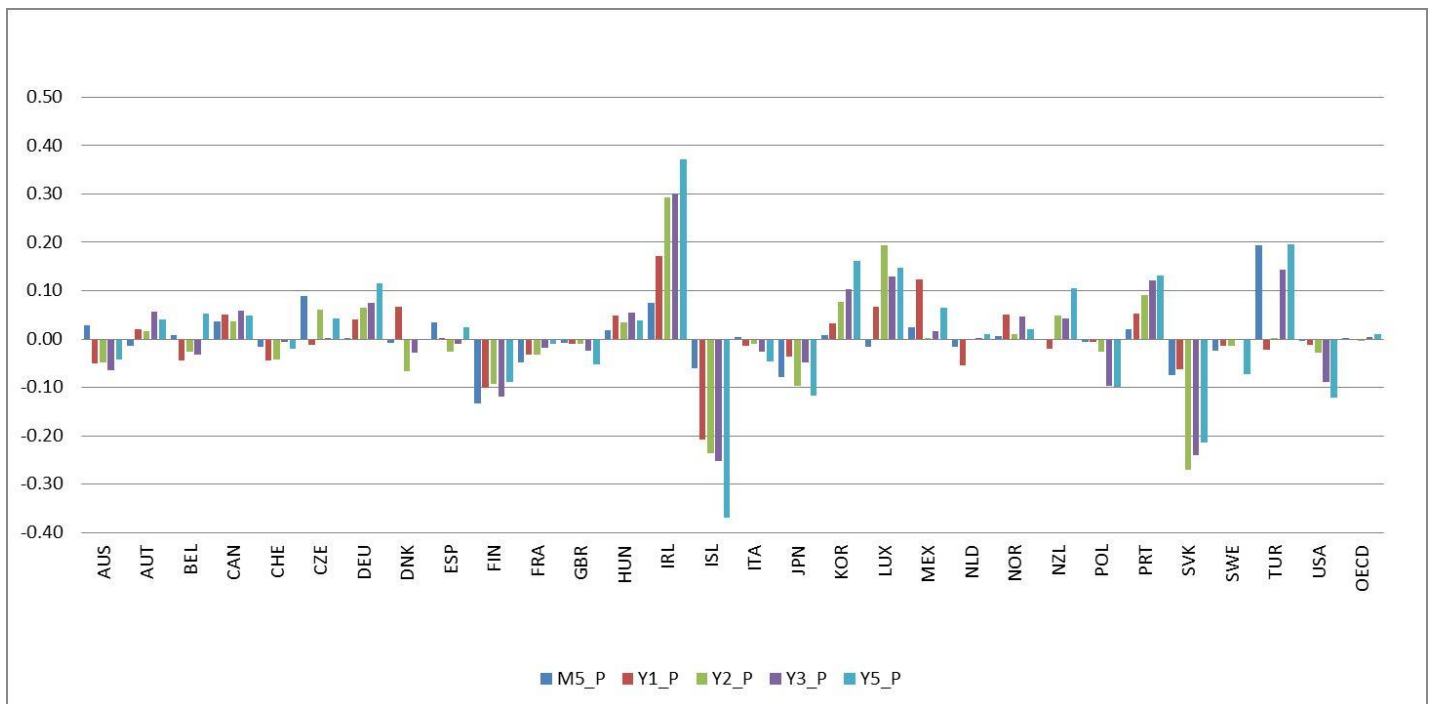


Figure 16. Mean Revision to first published estimates of QoQ growth rates for GCE

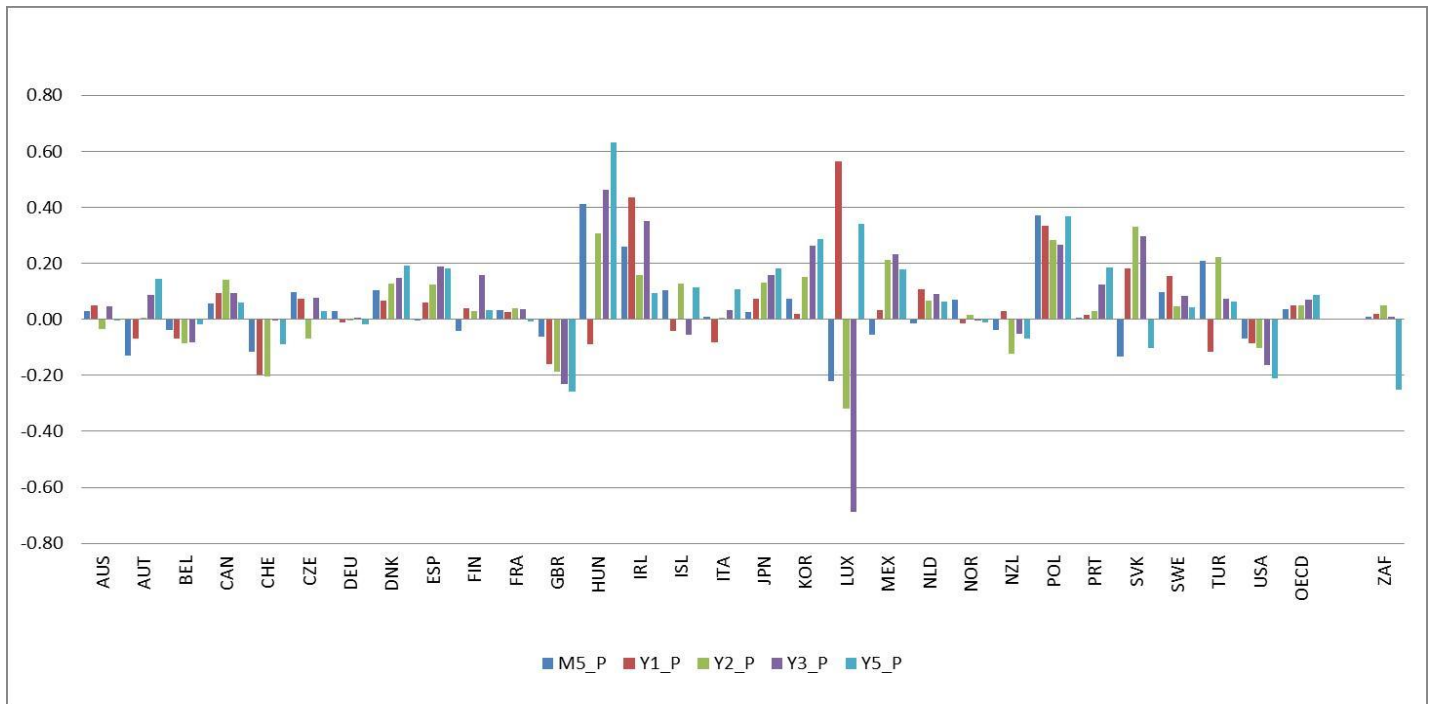


Figure 17. Mean Revision to first published estimates of QoQ growth rates for GFCF

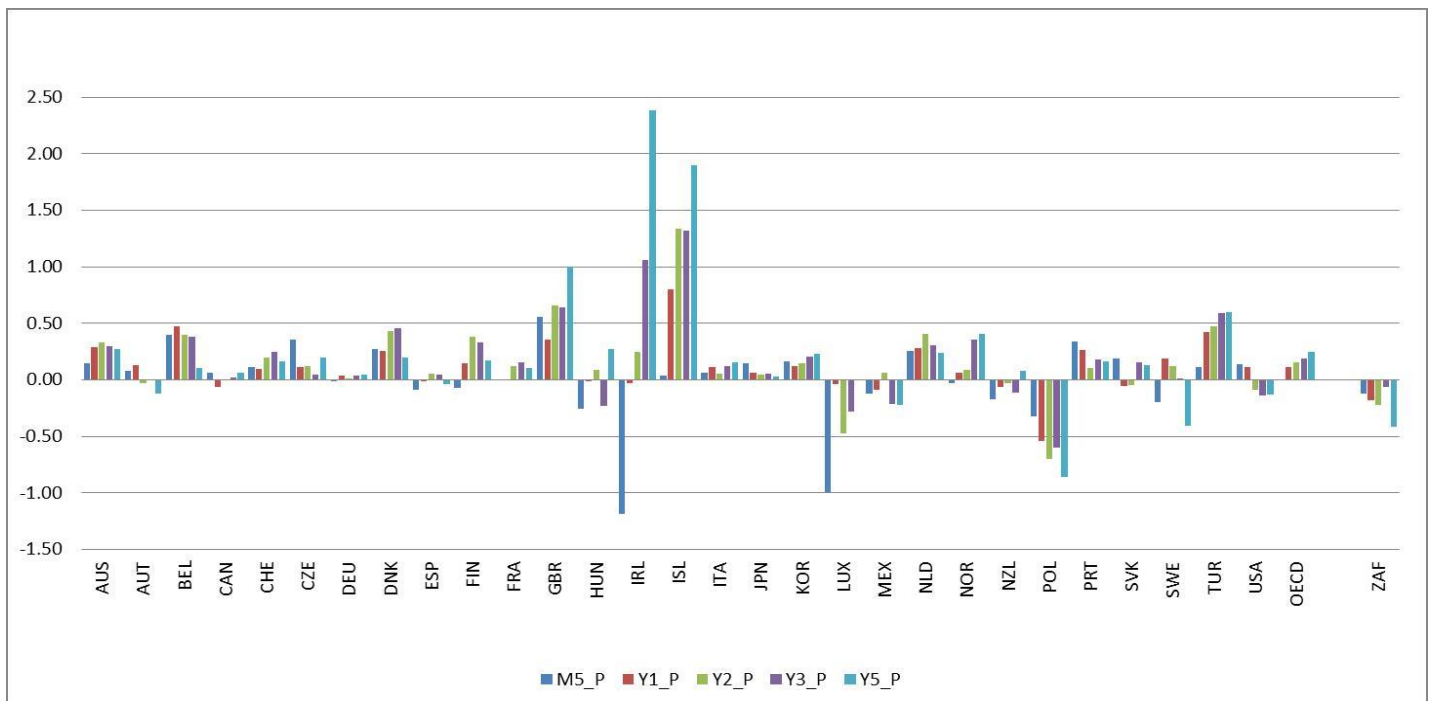


Figure 18. Mean Revision to first published estimates of QoQ growth rates for Exports

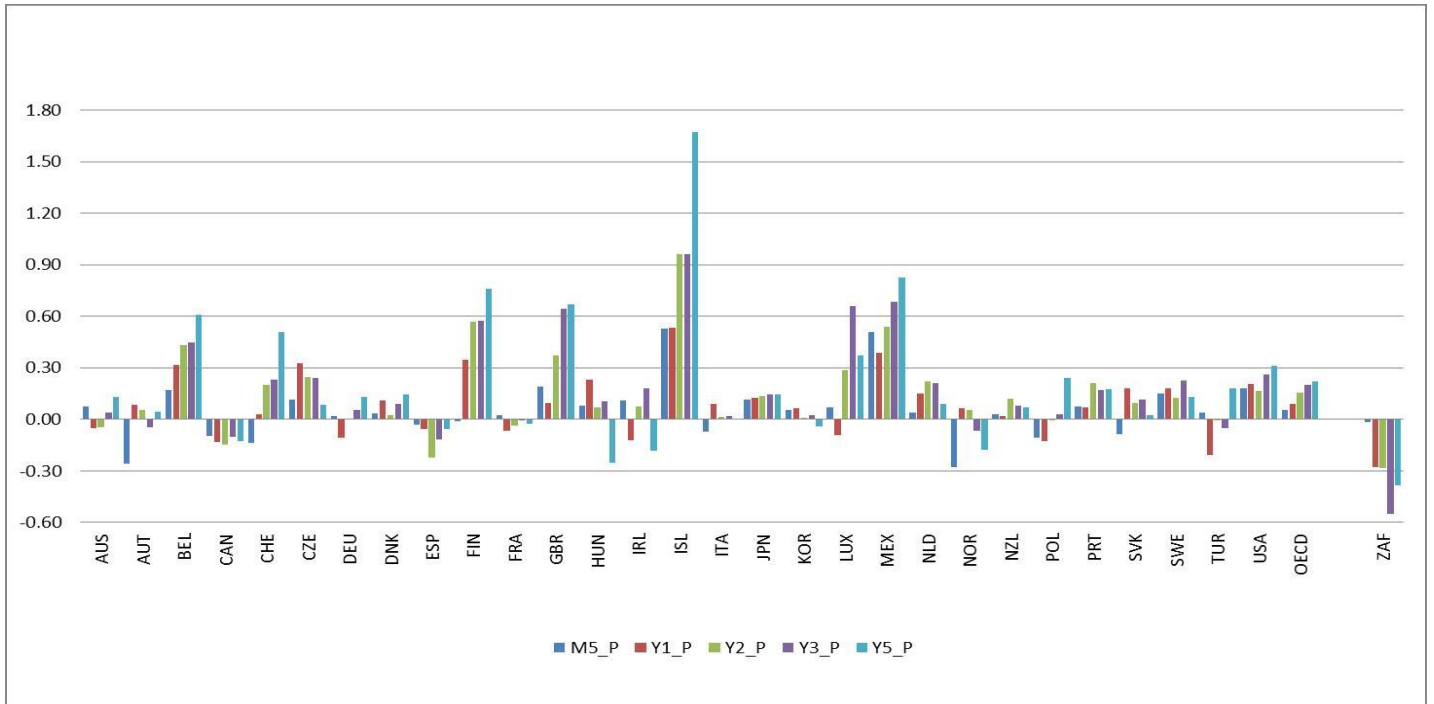
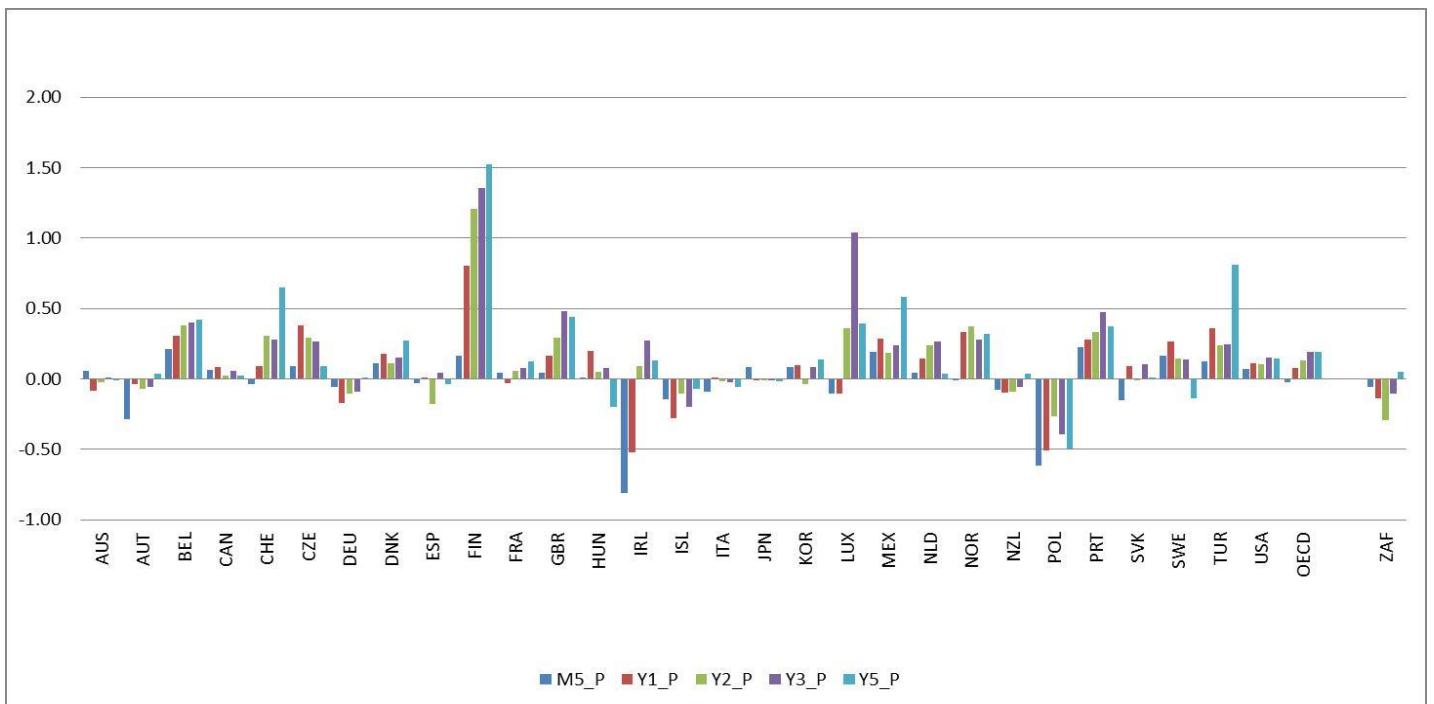


Figure 19. Mean Revision to first published estimates of QoQ growth rates for Imports



b) Size of revisions of the GDP components' growth rates across countries: MAR analysis

44. Figure 20 to Figure 24 show the MARs for PCE, GCE, GFCF, exports and imports for QoQ growth rates. These can be related to the MARs of GDP growth, as presented in Figure 5. It was found earlier that four countries recorded relatively high revisions for QoQ GDP growth rates across the five intervals: Iceland, Ireland, Luxembourg and Turkey. All of these countries also record relatively high absolute revisions for PCE. Furthermore, with the exception of Turkey they also record relatively high revisions for GFCF. For Turkey, on the other hand, the revisions turn out to be relatively large for GCE and for the trade flows. The latter is also the case for Iceland.

45. Some other observations can be derived from these figures:

- The revisions for PCE turn out to be lowest on average. However, as PCE usually has a large weight in GDP, the revisions may still strongly correlate with GDP revisions. In addition to Iceland, Ireland, Luxembourg and Turkey, the absolute revisions for this item are also relatively high in Denmark, Finland, Mexico and Switzerland (see Figure 20). Canada, France, Poland and the United States record relatively small revisions for this item.
- The size of revisions is also relatively moderate for GCE for most of the countries. Turkey is the country that reports the highest MAR for this item, followed by the Slovak Republic, Hungary and Luxembourg (see Figure 21). On the other end, France and Sweden report the lowest revisions for this item.
- The mean absolute revisions turn out to be relatively high for GFCF across countries. Ireland and Iceland clearly report the highest revisions for this item, followed by Luxembourg and the Slovak Republic. Furthermore, also Norway and Switzerland record relatively high absolute revisions for this item five years after the publication of the first estimate (see Figure 22). Revisions are relatively small for Canada, France, Italy and the United States.
- The trade flows also show relatively high mean absolute revisions (see Figure 23 and Figure 24). Iceland reports the largest revisions, with the ones to exports exceeding those to imports. Other countries that report relatively large revisions to their trade flows are Finland, Mexico, Switzerland and Turkey, as well as South Africa for exports and the Czech Republic, Ireland, Luxembourg and Poland for imports.

Figure 20. MAR to first published estimates of QoQ growth rates for PCE

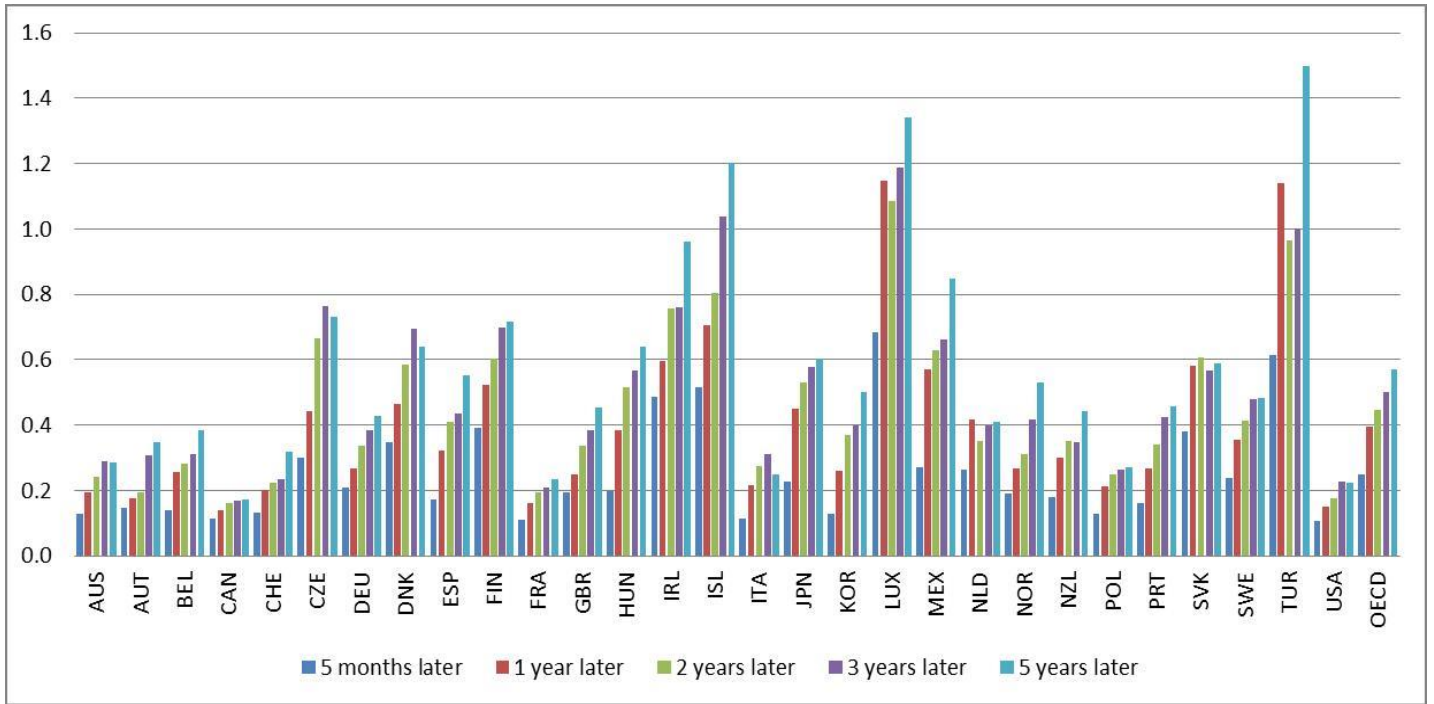


Figure 21. MAR to first published estimates of QoQ growth rates for GCE

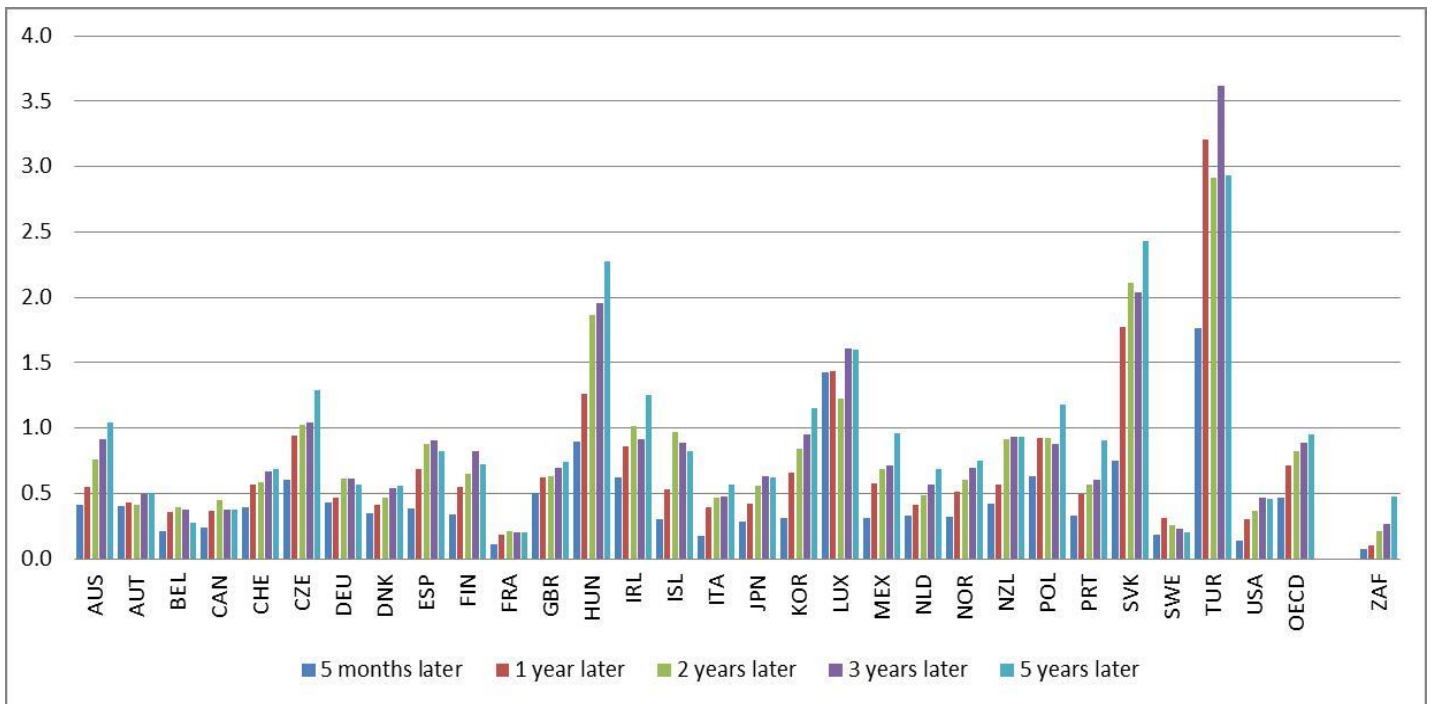


Figure 22. MAR to first published estimates of QoQ growth rates for GFCF

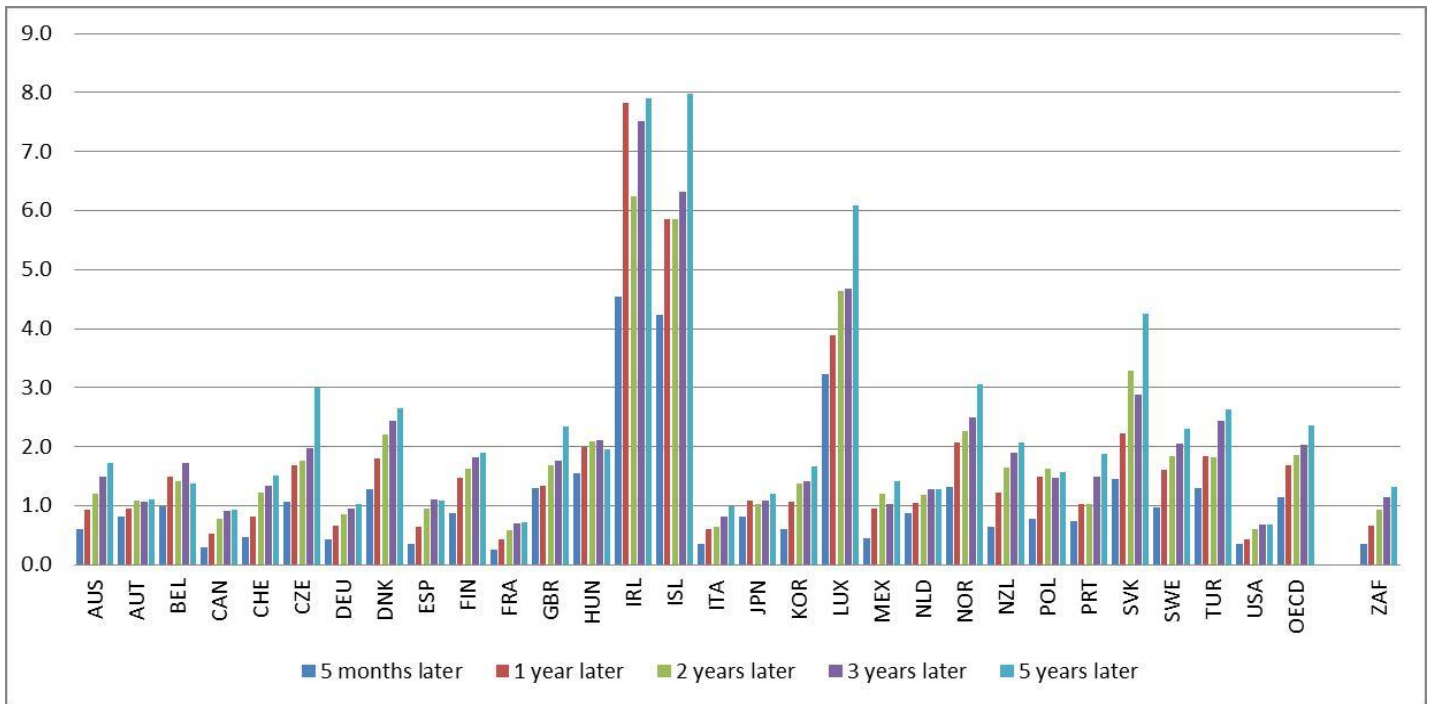


Figure 23. MAR to first published estimates of QoQ growth rates for Exports

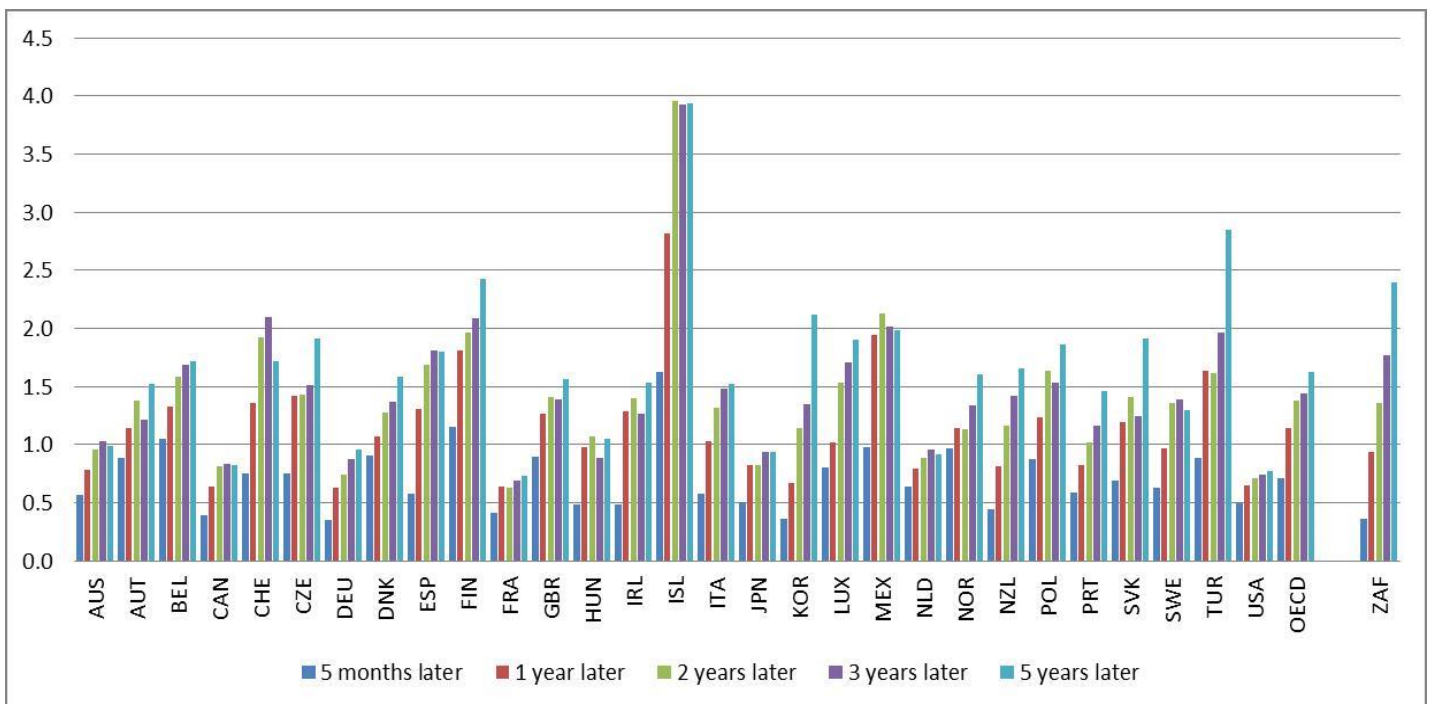
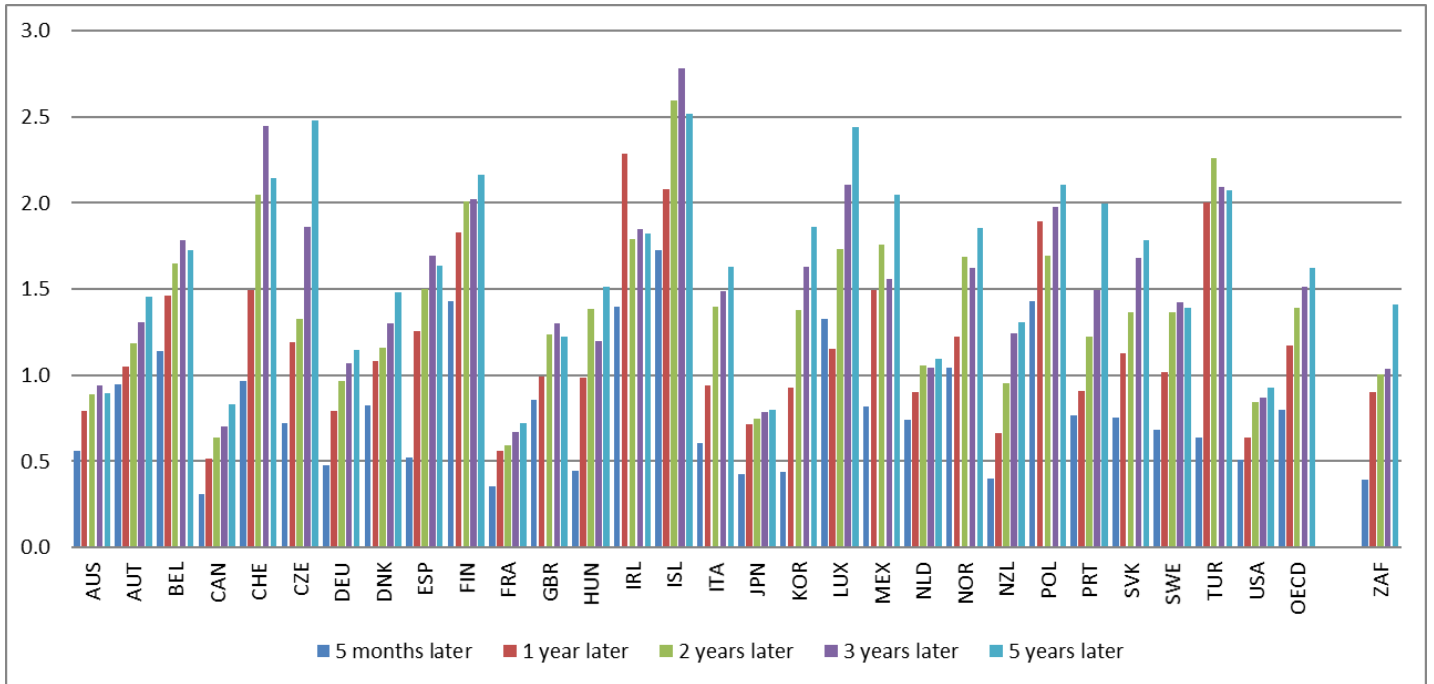


Figure 24. MAR to first published estimates of QoQ growth rates for Imports



V. CONCLUSIONS AND WAY FORWARD

46. This paper analysed the various vintages of volume growth rates in Gross Domestic Product (GDP) and its major expenditure components (except inventories). The main goal of the analysis was to provide useful insights to compilers and users of macro-economic statistics in the robustness of early estimates and in possible areas for investigation to improve estimates if necessary. When the latter are being put in place and additional measures to address the improvements show to be effective, users of statistical data can benefit from enhanced data quality. Furthermore, the improved insight in revisions may also help users to better interpret data on GDP growth and its expenditure components.

47. From the GDP cross-country analysis, it turned out that, on average, countries perform upward revisions. A group of twelve countries (Austria, Belgium, the Czech Republic, Finland, Germany, Iceland, Luxembourg, Poland, the Slovak Republic, Spain, Sweden and the United States) shows mean revisions that are not statistically significant. On the other hand, there are some countries that report statistical significant short-term mean revisions (Australia, Denmark, Indonesia and Ireland). Furthermore, it was shown that for most countries the sequence of revisions is random with the exception of a few countries for some specific time intervals (France, Mexico, Norway, Spain, the United Kingdom and the United States). Regression analysis showed that for five countries there seems to be a stronger correlation between the revisions and the size of the growth rate (India, Indonesia, Luxembourg, Poland and Switzerland) which may point to a potential dampening of first GDP estimates. Some other countries showed stronger correlations between the revisions and the change in the GDP growth rates (Belgium, Switzerland and the United Kingdom) which may point to potential delay in capturing turning points in the business cycle. The GDP analysis also showed that Iceland, India, Ireland, Luxembourg and Turkey record the highest relative mean absolute revisions. Furthermore, it appears that there is no clear evidence of revisions becoming smaller over time with only five countries (Australia, Indonesia, the Netherlands, Norway and South Africa) reporting decreasing revisions over time for some of the time intervals. Finally, it turns out that the direction of change and of the acceleration/deceleration is in most cases not altered by the revisions.

48. The GDP main components analysis identified relations between the revisions of GDP and revisions of expenditure components. It turned out that gross fixed capital formation and trade flows show the largest revisions, although results differ across countries. Several countries also report significant revisions for some of the components, including for private consumption expenditure and government consumption expenditure. It may show to be relevant for countries to further explore these results in relation to the results of the GDP analysis to assess whether they can make specific improvements.

49. Countries are invited to comment on the findings in this document. In that, it would be helpful if, especially in the case of larger revisions, they could provide more information on the distinction between statistical revisions and methodological ones. That would give more insight in the reasons for revisions and may help determining the fields where there is still a need to come up with solutions to improve the quality of early estimates. In that regard, countries are also invited to check the implementation dates of 1993 and 2008 SNA, and the dates for changes in seasonal adjustment as included in Table 7 of the Annex. Countries are also invited to share their thoughts on the new elements included in this revision analysis, i.e. the runs test and the regression analyses. Finally, countries are invited to share their ideas for future work on revisions and related international comparability studies.

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VII.ANNEX

Table 6. Period coverage of QoQ GDP growth rates by country

Country code	Country name	Period	Number of quarters
AUS	Australia	1995Q2-2018Q1	92
AUT	Austria	2003Q4-2018Q1	58
BEL	Belgium	1997Q1-2018Q1	85
BRA	Brazil	2006Q4-2018Q1	46
CAN	Canada	1995Q2-2018Q1	92
CHE	Switzerland	1995Q2-2018Q1	92
CZE	Czech Republic	2003Q4-2018Q1	58
DEU	Germany	1995Q2-2018Q1	92
DNK	Denmark	1995Q2-2018Q1	92
ESP	Spain	1995Q2-2018Q1	92
FIN	Finland	1995Q2-2018Q1	92
FRA	France	1995Q2-2018Q1	92
GBR	United Kingdom	1995Q2-2018Q1	92
HUN	Hungary	2005Q3-2018Q1	51
IDN	Indonesia	2001Q1-2018Q1	69
IND	India	2007Q3-2018Q1	43
IRL	Ireland	2004Q4-2017Q4	53
ISL	Iceland	2007Q1-2018Q1	45
ITA	Italy	1995Q2-2018Q1	92
JPN	Japan	1995Q2-2018Q1	92
KOR	Korea	1999Q3-2018Q1	75
LUX	Luxembourg	2007Q1-2018Q1	45
MEX	Mexico	2006Q4-2018Q1	46
NLD	Netherlands	1995Q2-2018Q1	92
NOR	Norway	1995Q2-2018Q1	92
NZL	New Zealand	1995Q2-2018Q1	92
POL	Poland	2007Q1-2018Q1	45
PRT	Portugal	1996Q2-2018Q1	88
SVK	Slovak Republic	2005Q4-2018Q1	50
SWE	Sweden	2007Q1-2018Q1	45
TUR	Turkey	2007Q1-2018Q1	45
USA	United States	1995Q3-2018Q1	91
ZAF	South Africa	2002Q2-2018Q1	64

Note:

For the purpose of this analysis, GDP data back to the MEI May 1995 edition has been used but earlier data is not available in the OECD MEI_ARCHIVE dataset which starts with the February 1999 edition.

Table 7. Implementation dates of SNA and changes in seasonal adjustment

Country	1993 SNA implementation date		2008 SNA implementation date		Date of change from seasonal adjustment (SA) done by OECD to SA done by country
	inclusion in OECD QNA database	inclusion in OECD MEI database	inclusion in OECD QNA database	inclusion in OECD MEI database	
AUS	Dec-1998	Jan-1999	Dec-2009	Feb-2010	May-1995 for GDP (Feb-1999 for components)
AUT	Jan-2000	Nov-2003	Oct-2014	Nov-2014	Nov-2003
BEL	Apr-1999	Jul-1999	Oct-2014	Nov-2014	Apr-1999
CAN	Dec-1997	Jan-1998	Oct-2012	Nov-2012	SA by country for the whole period analysed
CHE	Feb-2004	May-2004	Dec-2014	Jan-2015	Feb-2007
CZE	Sep-2004	Oct-2004	Oct-2014	Oct-2014	Mar-2003
DEU	Jun-1999	Jul-1999	Sep-2014	Sep-2014	SA by country for the whole period analysed
DNK	Feb-1998	Mar-1998	Oct-2014	Oct-2014	SA by country for the whole period analysed
ESP	Jun-2000	Jul-2000	Nov-2014	Dec-2014	SA by country for the whole period analysed
FIN	Apr-1999	May-1999	Oct-2014	Oct-2014	SA by country for the whole period analysed
FRA	Jul-1999	Aug-1999	Sep-2014	Oct-2014	SA by country for the whole period analysed
GBR	Sep-1998	Oct-1998	Sep-2014	Oct-2014	SA by country for the whole period analysed
HUN	Jul-2000	prior to the starting date of the period analysed	Dec-2014	Dec-2014	Jul-2005
IRL	Dec-1999	prior to the starting date of the period analysed	Jul-2014	Aug-2014	Nov-2004
ISL	Oct-2001	prior to the starting date of the period analysed	Sep-2014	Oct-2014	Feb-2007
ITA	Jul-1999	Jul-1999	Oct-2014	Nov-2014	SA by country for the whole period analysed
JPN	Nov-2000	Dec-2000	Dec-2016	Jan-2017	SA by country for the whole period analysed
KOR	Mar-2009	Apr-2009	Mar-2014	Apr-2014	Nov-2000
LUX	May-2005	prior to the starting date of the period analysed	Oct-2014	Nov-2014	Feb-2007
MEX	Jun-1996	prior to the starting date of the period analysed	Sep-2013	Sep-2013	Oct-2006
NZL	Dec-2000	Jul-2001	Dec-2014	Jan-2015	SA by country for the whole period analysed
NLD	Nov-1999	Nov-1999	Sep-2014	Oct-2014	SA by country for the whole period analysed
NOR	Aug-2000	Sep-2000	Dec-2014	Jan-2015	Oct-2000
POL	Dec-1999	prior to the starting date of the period analysed	Nov-2014	Jan-2015	Feb-2007
PRT	Jul-2000	Sep-2000	Sep-2014	Oct-2014	Nov-1996 for GDP (Feb-1999 for components)
SVK	Mar-2003	prior to the starting date of the period analysed	Dec-2014	Dec-2014	Oct-2005

Country	1993 SNA implementation date		2008 SNA implementation date		Date of change from seasonal adjustment (SA) done by OECD to SA done by country
	inclusion in OECD QNA database	inclusion in OECD MEI database	inclusion in OECD QNA database	inclusion in OECD MEI database	
SWE	Jun-1999	prior to the starting date of the period analysed	Sep-2014	Oct-2014	SA by country for the whole period analysed
TUR	Mar-2008	Apr-2008	Dec-2016	Jan-2017	Apr-2010 for GDP (May-2015 for components)
USA	Oct-1999	Feb-2000	Jul-2013	Aug-2013	SA by country for the whole period analysed
IND	prior to the starting date of the period analysed		Jan-2015	Mar-2015	SA not available from source and still done by the OECD
IDN	prior to the starting date of the period analysed		Feb-2015	Mar-2015	SA not available from source and still done by the OECD
BRA	prior to the starting date of the period analysed		Apr-2015	May-2015	SA by country from beginning
ZAF	prior to the starting date of the period analysed		Jun-2016	Jul-2016	SA by country from beginning

Notes:

The implementation date of 2008/1993 SNA at national level should match in general the date of inclusion in the OECD QNA database. Seven OECD member countries (Chile, Estonia, Greece, Israel, Latvia, Lithuania, and Slovenia) are not included in the analysis because data for real seasonally adjusted (s.a.) GDP is available for less than 10 years in the OECD MEI_ARCHIVE dataset following recent membership to the OECD. As for Greece, following a benchmark update on 2005-2010 data in 2011, a break was introduced in the GDP series that prevented the seasonal adjustment by the Greek statistical authorities/the OECD. The release of s.a. GDP data for Greece resumed in November 2014 only.

Table 8. Mean revision and assessment of statistical significance for GDP QoQ and YoY growth rates – additional intervals

Country	Y1_M5		Y2_Y1		Y3_Y2		Y5_Y3	
	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY
AUS	-0.03	0.04	0.03	0.08	0.05	0.11	0.00	-0.03
AUT	0.00	0.05	0.02	0.03	0.03	0.03	0.00	-0.10
BEL	0.01	0.01	-0.01	0.01	0.03	0.03	0.01	0.08
CAN	-0.01	0.06	0.03	0.08	0.03	0.11	0.03	0.06
CHE	-0.01	0.02	0.05	0.16	0.04	0.11	0.00	0.02
CZE	0.02	0.09	0.06	0.17	0.02	0.04	0.03	0.04
DEU	0.01	0.02	0.00	-0.04	-0.02	0.00	0.04	0.10
DNK	-0.01	0.02	0.02	-0.03	-0.02	0.05	0.03	0.01
ESP	0.01	0.03	0.00	0.04	0.03	0.02	-0.02	0.00
FIN	0.03	0.08	-0.02	-0.04	0.01	0.07	-0.02	-0.12
FRA	0.00	0.03	0.03	0.13	0.02	0.03	0.00	-0.01
GBR	-0.01	0.01	0.02	0.09	0.03	0.07	0.02	0.13
HUN	0.02	0.09	0.00	0.05	0.04	0.10	-0.04	-0.17
IRL	0.04	-0.02	-0.01	0.45	-0.08	-0.04	0.05	0.02
ISL	-0.11	-0.05	0.07	-0.03	-0.04	0.23	0.07	0.38
ITA	-0.03	-0.01	0.01	0.07	0.03	0.06	-0.01	0.06
JPN	0.02	-0.04	0.00	0.24	0.10	0.12	-0.05	-0.14
KOR	0.00	0.04	0.04	0.16	0.02	0.01	-0.04	-0.04
LUX	-0.26	-0.66	0.14	0.44	-0.21	0.19	0.18	0.10
MEX	0.08	0.07	-0.02	0.11	-0.01	0.02	0.07	0.20
NLD	0.05	0.03	0.02	0.18	0.04	0.13	0.01	0.05
NOR	0.05	0.09	-0.01	-0.04	-0.01	-0.01	-0.02	-0.02
NZL	0.02	0.09	0.03	0.15	0.02	0.05	0.09	0.26
POL	0.01	0.07	0.00	-0.03	-0.02	-0.03	0.04	0.07
PRT	-0.08	0.03	0.05	0.11	0.02	0.08	0.03	0.07
SVK	0.01	0.07	-0.02	-0.04	-0.02	-0.09	0.01	0.08
SWE	0.03	0.01	-0.08	-0.10	0.03	-0.05	-0.03	-0.11
TUR	0.06	0.18	0.02	0.25	0.20	0.52	0.18	0.90
USA	0.00	-0.03	-0.04	-0.22	-0.02	-0.03	0.01	0.03
OECD	0.00	0.02	0.01	0.08	0.01	0.07	0.02	0.07
BRA	0.01	0.02	-0.02	0.08	0.07	0.26	0.07	0.20
IDN	0.00	0.03	-0.03	0.07	0.01	-0.04	-0.02	0.00
IND	0.02	0.28	0.21	0.41	-0.12	-0.03	0.05	-0.28
ZAF	0.03	0.21	0.08	0.19	0.05	0.07	-0.01	0.00

Table 9. Mean revision and assessment of statistical significance for PCE QoQ and YoY growth rates

Country	M5_P		Y1_P		Y2_P		Y3_P		Y5_P		Y1_M5		Y2_Y1		Y3_Y2	
	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY
AUS	0.03	-0.05	-0.05	-0.18	-0.05	-0.22	-0.06	-0.27	-0.04	-0.16	-0.07	-0.11	0.00	-0.03	-0.01	-0.03
AUT	-0.02	-0.06	0.02	-0.07	0.02	0.05	0.06	0.18	0.04	0.03	0.04	-0.01	0.00	0.13	0.05	0.14
BEL	0.01	-0.09	-0.05	-0.19	-0.03	-0.03	-0.03	0.02	0.05	0.12	-0.05	-0.11	0.03	0.21	0.01	0.01
CAN	0.04	0.05	0.05	0.07	0.04	0.06	0.06	0.10	0.05	0.04	0.01	0.02	-0.02	-0.02	0.03	0.05
CHE	-0.02	-0.05	-0.04	-0.13	-0.04	-0.08	-0.01	-0.05	-0.02	-0.11	-0.03	-0.08	0.01	0.08	0.04	0.07
CZE	0.09	-0.01	-0.01	0.16	0.06	0.41	0.00	0.39	0.04	0.16	-0.10	0.17	0.09	0.29	-0.04	0.01
DEU	0.00	0.05	0.04	0.15	0.07	0.20	0.08	0.34	0.11	0.42	0.04	0.10	0.03	0.06	0.01	0.12
DNK	-0.01	0.01	0.07	-0.01	-0.07	-0.23	-0.03	0.05	0.00	0.08	0.06	-0.02	-0.14	-0.22	0.07	0.28
ESP	0.03	0.02	0.00	-0.12	-0.03	-0.17	-0.01	-0.24	0.02	-0.07	-0.03	-0.14	-0.03	-0.05	0.01	-0.09
FIN	-0.13	-0.11	-0.10	-0.21	-0.09	-0.05	-0.12	-0.09	-0.09	-0.08	0.03	-0.11	-0.02	0.10	-0.01	0.00
FRA	-0.05	-0.03	-0.03	0.01	-0.03	0.01	-0.02	0.13	-0.01	0.09	0.02	0.04	0.01	0.02	0.03	0.12
GBR	-0.01	0.00	-0.01	0.01	-0.01	-0.03	-0.02	-0.11	-0.05	-0.18	-0.01	-0.01	-0.01	-0.05	-0.02	-0.09
HUN	0.02	0.02	0.05	0.08	0.03	0.21	0.05	0.26	0.04	0.23	0.04	0.08	-0.02	0.09	0.02	0.07
IRL	0.07	0.12	0.17	0.43	0.29	0.58	0.30	0.96	0.37	1.12	0.07	0.21	0.09	0.13	-0.01	0.28
ISL	-0.06	-0.25	-0.21	-0.64	-0.24	-0.74	-0.25	-0.75	-0.37	-0.58	-0.15	-0.39	-0.01	0.00	0.05	0.11
ITA	0.00	-0.02	-0.01	-0.04	-0.01	-0.02	-0.03	-0.06	-0.05	-0.11	-0.02	-0.02	0.02	0.04	-0.01	0.02
JPN	-0.08	-0.08	-0.04	-0.13	-0.10	0.00	-0.05	-0.08	-0.12	-0.16	0.04	-0.05	-0.05	0.13	0.06	-0.02
KOR	0.01	0.04	0.03	0.14	0.08	0.35	0.10	0.42	0.16	0.66	0.03	0.10	0.04	0.20	0.02	0.06
LUX	-0.02	0.13	0.07	1.12	0.19	0.94	0.13	0.94	0.15	0.07	0.12	0.99	0.23	-0.07	0.01	0.37
MEX	0.02	0.10	0.12	0.15	0.00	0.10	0.02	0.12	0.07	0.18	0.09	0.05	-0.12	-0.07	0.04	0.07
NLD	-0.02	-0.08	-0.05	-0.06	0.00	0.10	0.00	0.21	0.01	0.31	-0.04	0.02	0.06	0.15	0.01	0.14
NOR	0.01	0.05	0.05	0.13	0.01	0.10	0.05	0.14	0.02	0.13	0.04	0.07	-0.04	-0.05	0.04	0.05
NZL	0.00	-0.05	-0.02	-0.07	0.05	0.19	0.04	0.11	0.11	0.25	-0.02	-0.02	0.08	0.30	-0.01	-0.04
POL	-0.01	-0.03	-0.01	0.00	-0.03	-0.14	-0.10	-0.24	-0.10	-0.05	0.00	0.02	-0.01	-0.10	-0.05	-0.10
PRT	0.02	0.07	0.05	0.11	0.09	0.25	0.12	0.31	0.13	0.33	0.03	0.04	0.03	0.15	0.01	0.01
SVK	-0.07	-0.08	-0.06	-0.16	-0.27	-0.36	-0.24	-0.54	-0.21	-0.24	0.01	-0.07	-0.15	-0.17	0.06	-0.14
SWE	-0.02	-0.01	-0.01	0.00	-0.01	0.04	0.00	0.01	-0.07	0.01	0.01	-0.02	0.01	0.03	0.00	0.01
TUR	0.19	-0.10	-0.02	-0.43	0.00	-0.20	0.14	0.17	0.20	0.77	-0.22	-0.33	0.16	0.35	0.09	0.35
USA	0.00	-0.02	-0.01	-0.05	-0.03	-0.17	-0.09	-0.40	-0.12	-0.44	-0.01	-0.02	-0.01	-0.11	-0.06	-0.20
OECD	0.00	-0.02	0.00	0.00	0.00	0.04	0.00	0.07	0.01	0.10	0.00	0.02	0.01	0.05	0.02	0.06

Table 10. Mean revision and assessment of statistical significance for GCE QoQ and YoY growth rates

Country	M5 P		Y1 P		Y2 P		Y3 P		Y5 P		Y1 M5		Y2 Y1		Y3 Y2	
	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY
AUS	0.03	-0.04	0.05	-0.05	-0.03	-0.32	0.05	-0.25	0.00	-0.25	0.02	-0.01	-0.07	-0.23	0.07	0.13
AUT	-0.13	-0.22	-0.07	-0.10	0.00	0.02	0.09	0.14	0.14	0.27	0.05	0.12	0.05	0.22	0.09	0.12
BEL	-0.04	-0.10	-0.07	-0.20	-0.09	-0.18	-0.08	-0.23	-0.02	-0.03	-0.01	-0.06	-0.02	0.04	0.00	0.00
CAN	0.06	0.08	0.09	0.20	0.14	0.22	0.09	0.05	0.06	0.08	0.04	0.12	0.05	0.03	-0.04	-0.15
CHE	-0.12	-0.22	-0.20	-0.27	-0.20	-0.09	0.00	0.64	-0.09	0.30	-0.08	-0.05	0.00	0.17	0.21	0.66
CZE	0.10	0.14	0.07	0.06	-0.07	-0.24	0.08	0.16	0.03	0.06	-0.03	-0.09	-0.13	-0.28	0.10	0.29
DEU	0.03	0.05	-0.01	-0.09	0.00	-0.04	0.01	-0.09	-0.02	-0.10	-0.04	-0.14	-0.01	0.04	0.02	-0.01
DNK	0.10	0.05	0.07	0.04	0.13	0.14	0.15	0.27	0.19	0.55	-0.04	-0.02	0.04	0.10	0.00	0.09
ESP	0.00	0.08	0.06	0.20	0.12	0.61	0.19	0.82	0.18	0.95	0.06	0.13	0.07	0.40	0.04	0.16
FIN	-0.04	0.15	0.04	0.30	0.03	0.19	0.16	0.33	0.03	0.11	0.09	0.16	0.00	-0.05	0.17	0.15
FRA	0.03	0.06	0.03	0.06	0.04	0.12	0.04	0.08	-0.01	-0.13	0.00	0.00	0.01	0.04	-0.01	-0.09
GBR	-0.06	-0.34	-0.16	-0.50	-0.19	-0.66	-0.23	-0.61	-0.26	-0.76	-0.10	-0.17	-0.04	-0.15	-0.05	0.01
HUN	0.41	-0.16	-0.09	0.05	0.31	0.58	0.46	0.89	0.63	0.78	-0.50	0.24	0.34	0.44	0.16	0.27
IRL	0.26	0.26	0.44	0.29	0.16	0.78	0.35	0.35	0.09	0.22	0.14	0.00	-0.33	0.49	0.31	-0.36
ISL	0.10	0.07	-0.04	-0.04	0.13	0.02	-0.05	-0.09	0.11	0.11	-0.15	-0.11	0.18	0.16	-0.16	-0.07
ITA	0.01	-0.07	-0.08	-0.12	0.00	0.19	0.03	0.27	0.11	0.52	-0.09	-0.05	0.08	0.28	0.02	0.03
JPN	0.03	0.11	0.07	0.17	0.13	0.31	0.16	0.31	0.18	0.27	0.04	0.06	0.03	0.11	0.03	0.01
KOR	0.07	0.02	0.02	0.13	0.15	0.48	0.26	0.66	0.29	0.73	-0.07	0.10	0.13	0.36	0.10	0.13
LUX	-0.22	1.00	0.57	3.26	-0.32	0.28	-0.69	1.06	0.34	1.90	0.82	2.30	-0.92	-3.27	-0.30	0.47
MEX	-0.06	0.05	0.03	0.52	0.21	0.75	0.23	0.79	0.18	1.18	0.09	0.47	0.16	0.29	0.01	-0.10
NLD	-0.01	0.14	0.11	0.10	0.07	0.22	0.09	0.34	0.06	0.30	0.13	-0.03	-0.05	0.12	0.02	0.09
NOR	0.07	0.05	-0.01	0.16	0.01	-0.10	0.00	-0.23	-0.01	-0.41	-0.08	0.11	0.03	-0.27	-0.03	-0.11
NZL	-0.04	-0.07	0.03	-0.27	-0.12	-0.34	-0.05	-0.16	-0.07	-0.28	0.07	-0.21	-0.16	-0.12	0.08	0.20
POL	0.37	0.61	0.34	0.64	0.28	0.43	0.27	0.48	0.37	0.91	-0.05	0.03	-0.14	-0.41	-0.01	-0.12
PRT	0.01	0.12	0.02	0.17	0.03	0.30	0.12	0.60	0.18	0.52	0.01	0.06	0.00	0.10	0.08	0.31
SVK	-0.13	0.14	0.18	0.22	0.33	0.72	0.29	0.70	-0.10	0.43	0.32	0.12	0.12	0.44	-0.04	0.08
SWE	0.10	0.21	0.15	0.06	0.05	-0.11	0.08	0.05	0.04	-0.01	0.06	-0.13	-0.12	-0.16	0.07	0.19
TUR	0.21	0.13	-0.12	0.07	0.22	-0.13	0.07	0.68	0.06	0.38	-0.19	0.09	0.16	-0.34	-0.02	0.31
USA	-0.07	-0.08	-0.09	-0.06	-0.10	-0.31	-0.16	-0.48	-0.21	-0.58	-0.02	0.02	-0.01	-0.24	-0.04	-0.08
OECD	0.04	0.08	0.05	0.17	0.05	0.13	0.07	0.26	0.09	0.28	0.02	0.11	-0.02	-0.06	0.03	0.09
ZAF	0.01	0.02	0.02	0.07	0.05	0.08	0.01	-0.24	-0.25	-0.88	0.02	0.06	0.04	0.06	-0.01	-0.35

Table 11. Mean revision and assessment of statistical significance for GFCF QoQ and YoY growth rates

Country	M5_P		Y1_P		Y2_P		Y3_P		Y5_P		Y1_M5		Y2_Y1		Y3_Y2	
	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY
AUS	0.15	0.19	0.28	0.15	0.33	0.27	0.30	0.47	0.27	0.38	0.13	-0.03	0.06	0.16	0.00	0.27
AUT	0.07	0.18	0.13	0.02	-0.03	0.26	-0.01	0.20	-0.12	-0.58	0.09	-0.14	-0.09	0.29	0.11	0.08
BEL	0.40	0.51	0.47	0.52	0.39	0.24	0.38	0.30	0.10	0.12	0.03	-0.04	-0.09	-0.23	-0.01	0.08
CAN	0.06	-0.06	-0.07	-0.12	0.00	-0.13	0.02	0.32	0.06	0.13	-0.12	-0.05	0.07	0.03	0.01	0.36
CHE	0.12	0.15	0.09	0.16	0.20	0.61	0.25	0.59	0.16	0.46	-0.01	0.03	0.12	0.52	0.07	0.04
CZE	0.36	0.05	0.11	-0.93	0.12	-0.04	0.05	-0.37	0.20	0.21	-0.27	-0.99	-0.02	1.00	0.00	-0.04
DEU	-0.02	0.06	0.04	0.06	0.00	0.24	0.04	0.34	0.05	0.43	0.06	0.00	-0.03	0.23	0.07	0.08
DNK	0.27	0.65	0.26	0.91	0.43	1.47	0.45	1.03	0.19	0.01	-0.01	0.24	0.21	0.68	0.02	-0.33
ESP	-0.09	0.02	-0.02	0.28	0.05	0.52	0.04	0.57	-0.04	0.47	0.08	0.27	0.07	0.22	-0.01	0.03
FIN	-0.08	0.37	0.15	0.82	0.38	0.88	0.33	0.90	0.17	0.79	0.20	0.37	0.18	0.11	-0.03	0.16
FRA	0.00	0.02	-0.01	0.20	0.12	0.73	0.16	0.61	0.11	0.56	0.00	0.20	0.14	0.54	0.04	-0.10
GBR	0.56	0.55	0.36	0.71	0.65	0.75	0.64	1.17	1.00	1.51	-0.21	0.18	0.26	0.11	-0.10	0.27
HUN	-0.25	-0.14	-0.01	0.17	0.09	-0.04	-0.23	0.37	0.27	1.28	0.25	0.22	0.29	-0.15	-0.28	0.40
IRL	-1.19	-0.94	-0.03	2.08	0.25	1.98	1.06	3.59	2.38	8.88	0.98	3.15	0.51	1.49	0.44	1.30
ISL	0.04	1.26	0.80	1.34	1.34	2.20	1.32	2.43	1.90	2.88	0.82	0.15	0.42	0.61	-0.10	-0.07
ITA	0.06	0.10	0.11	0.22	0.05	0.15	0.12	0.12	0.15	0.51	0.05	0.14	-0.04	-0.06	0.09	0.04
JPN	0.15	0.08	0.06	-0.03	0.05	0.11	0.06	0.06	0.03	0.08	-0.10	-0.14	-0.01	0.16	0.01	-0.03
KOR	0.16	0.16	0.12	0.29	0.15	0.41	0.20	0.54	0.23	0.71	-0.05	0.11	0.01	0.12	0.04	0.18
LUX	-1.00	-0.82	-0.04	-0.70	-0.48	-2.65	-0.28	-1.25	-0.01	-0.20	1.13	0.41	-0.31	-1.51	0.24	1.60
MEX	-0.12	-0.09	-0.09	0.02	0.06	0.21	-0.21	-0.53	-0.22	-0.54	0.03	0.09	0.07	0.12	-0.28	-0.47
NLD	0.25	0.35	0.28	0.46	0.41	0.49	0.31	0.33	0.24	0.46	0.02	0.11	0.11	-0.01	-0.09	-0.10
NOR	-0.03	-0.09	0.06	-0.37	0.08	0.17	0.36	0.69	0.40	0.84	0.05	-0.30	0.06	0.59	0.27	0.42
NZL	-0.18	-0.04	-0.06	0.55	-0.03	0.20	-0.12	0.18	0.08	0.77	0.13	0.58	0.00	-0.41	-0.06	0.08
POL	-0.32	-0.59	-0.55	-0.59	-0.70	-0.31	-0.60	-0.26	-0.86	-0.38	-0.19	0.06	-0.01	0.15	-0.16	-0.22
PRT	0.34	0.28	0.26	0.26	0.10	0.42	0.18	0.56	0.16	0.83	-0.06	-0.01	-0.11	0.24	0.18	0.29
SVK	0.19	-0.21	-0.05	-0.55	-0.04	-0.22	0.16	-0.96	0.13	-1.03	-0.21	-0.32	-0.11	0.29	0.13	-0.29
SWE	-0.19	0.09	0.19	0.10	0.12	0.02	0.01	-0.33	-0.41	-1.12	0.34	-0.08	-0.04	-0.14	-0.12	-0.35
TUR	0.11	0.44	0.42	1.26	0.47	1.20	0.59	2.01	0.60	3.06	0.28	0.76	0.00	-0.08	0.25	1.41
USA	0.14	0.12	0.11	-0.07	-0.09	-1.00	-0.14	-0.85	-0.13	-0.89	-0.03	-0.19	-0.20	-0.91	-0.03	0.20
OECD	0.00	0.09	0.12	0.25	0.15	0.31	0.19	0.44	0.25	0.71	0.12	0.17	0.05	0.14	0.02	0.18
ZAF	-0.12	-0.23	-0.18	0.06	-0.22	-0.01	-0.06	-0.15	-0.42	-1.74	-0.09	0.29	0.00	-0.01	0.07	-0.14

Table 12. Mean revision and assessment of statistical significance for Exports QoQ and YoY growth rates

Country	M5 P		Y1 P		Y2 P		Y3 P		Y5 P		Y1 M5		Y2_Y1		Y3_Y2	
	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY
AUS	0.07	-0.06	-0.05	-0.05	-0.05	0.17	0.04	0.24	0.13	0.39	-0.13	0.01	0.03	0.17	0.06	0.05
AUT	-0.26	-0.02	0.09	0.38	0.06	0.40	-0.05	-0.09	0.05	0.73	0.37	0.45	-0.02	0.06	-0.09	-0.38
BEL	0.17	0.55	0.32	0.83	0.43	1.00	0.45	1.06	0.61	1.58	0.13	0.24	0.14	0.33	-0.04	-0.02
CAN	-0.10	-0.15	-0.13	-0.27	-0.15	-0.03	-0.10	0.06	-0.12	0.01	-0.05	-0.12	0.01	0.26	0.06	0.12
CHE	-0.14	-0.11	0.03	0.70	0.20	1.19	0.23	1.27	0.51	1.81	0.20	0.84	0.20	0.58	0.08	0.05
CZE	0.11	0.32	0.33	0.68	0.25	0.46	0.24	0.39	0.08	-0.52	0.22	0.37	-0.13	-0.27	-0.03	-0.17
DEU	0.02	-0.14	-0.11	-0.12	0.00	0.15	0.05	0.48	0.13	0.52	-0.12	0.03	0.12	0.27	0.04	0.31
DNK	0.03	0.04	0.11	0.41	0.03	0.21	0.09	0.32	0.14	0.09	0.07	0.35	-0.04	-0.09	0.09	0.33
ESP	-0.03	-0.11	-0.06	-0.30	-0.22	-0.43	-0.12	-0.13	-0.06	-0.24	-0.02	-0.17	-0.19	-0.14	0.12	0.27
FIN	-0.01	0.58	0.35	1.75	0.57	2.51	0.58	2.17	0.76	2.78	0.38	1.16	0.27	0.73	0.01	-0.36
FRA	0.02	-0.07	-0.06	-0.24	-0.03	-0.23	-0.01	-0.01	-0.03	0.03	-0.10	-0.16	0.05	0.06	0.04	0.17
GBR	0.19	0.63	0.10	1.21	0.37	1.55	0.64	2.31	0.67	2.26	-0.05	0.65	0.29	0.35	0.16	0.61
HUN	0.08	0.32	0.23	0.38	0.07	0.32	0.10	0.00	-0.25	-0.96	0.19	0.11	-0.09	-0.13	0.01	-0.38
IRL	0.11	-0.02	-0.12	-0.43	0.08	0.71	0.18	0.22	-0.18	-0.83	-0.21	-0.41	0.17	1.38	0.10	-0.15
ISL	0.53	0.23	0.54	0.59	0.96	0.79	0.96	0.87	1.68	1.05	-0.03	0.33	0.31	0.19	-0.13	0.16
ITA	-0.07	0.11	0.09	0.00	0.01	0.25	0.02	0.30	0.00	0.44	0.16	-0.10	-0.03	0.32	0.02	0.09
JPN	0.12	0.12	0.13	0.12	0.14	0.01	0.15	-0.01	0.15	-0.07	0.02	0.01	0.01	-0.07	0.01	0.02
KOR	0.06	0.08	0.06	0.08	0.01	-0.17	0.02	0.17	-0.04	0.22	0.00	-0.02	-0.05	-0.22	0.04	0.36
LUX	0.07	-0.23	-0.09	0.22	0.28	1.92	0.66	1.95	0.37	1.13	-0.18	0.41	0.34	1.58	0.32	0.11
MEX	0.51	0.27	0.39	0.09	0.54	0.23	0.68	0.10	0.82	0.32	-0.14	-0.21	0.08	0.32	0.09	-0.08
NLD	0.04	0.21	0.15	0.44	0.22	0.95	0.21	0.93	0.09	0.58	0.11	0.23	0.09	0.53	0.02	0.05
NOR	-0.28	0.00	0.07	0.24	0.06	0.19	-0.07	-0.08	-0.18	-0.30	0.34	0.23	-0.03	-0.11	-0.12	-0.22
NZL	0.03	-0.03	0.02	0.01	0.12	0.22	0.08	0.15	0.07	0.37	-0.01	0.04	0.12	0.22	0.00	-0.04
POL	-0.11	0.02	-0.13	0.42	0.00	1.04	0.03	1.12	0.24	1.42	0.00	0.45	0.19	0.66	0.02	0.13
PRT	0.07	0.10	0.07	0.27	0.21	0.46	0.17	0.34	0.18	0.38	-0.01	0.15	0.13	0.20	-0.06	-0.08
SVK	-0.09	0.26	0.18	0.63	0.10	0.51	0.11	0.54	0.02	0.26	0.28	0.36	-0.09	-0.10	0.04	0.01
SWE	0.15	0.18	0.18	0.31	0.12	0.09	0.22	0.06	0.13	-0.39	0.06	0.15	-0.09	-0.23	0.09	0.02
TUR	0.04	0.08	-0.21	0.44	0.00	1.19	-0.05	0.95	0.18	1.77	-0.23	0.36	0.27	0.64	0.00	0.02
USA	0.18	0.21	0.21	0.07	0.16	0.17	0.26	0.41	0.31	0.36	0.02	-0.15	-0.06	0.06	0.06	0.15
OECD	0.05	0.12	0.09	0.31	0.16	0.55	0.20	0.56	0.22	0.52	0.04	0.19	0.07	0.26	0.04	0.04
ZAF	-0.01	-0.38	-0.28	-0.80	-0.28	-1.01	-0.55	-0.46	-0.38	0.02	-0.20	-0.46	-0.03	-0.06	-0.28	0.10

Table 13. Mean revision and assessment of statistical significance for Imports QoQ and YoY growth rates

Country	M5 P		Y1 P		Y2 P		Y3 P		Y5 P		Y1_M5		Y2_Y1		Y3_Y2	
	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY	QoQ	YoY
AUS	0.06	-0.07	-0.08	-0.08	-0.02	0.03	0.00	0.05	-0.01	-0.03	-0.14	0.01	0.08	0.10	0.05	0.09
AUT	-0.29	-0.20	-0.04	-0.02	-0.07	0.16	-0.06	0.38	0.04	0.73	0.21	0.15	-0.06	0.24	-0.04	0.27
BEL	0.21	0.51	0.30	0.73	0.38	0.80	0.40	0.87	0.42	1.11	0.08	0.17	0.12	0.32	-0.01	-0.01
CAN	0.07	0.06	0.08	-0.03	0.02	0.02	0.06	0.17	0.03	0.02	0.01	-0.08	-0.04	0.07	0.06	0.20
CHE	-0.04	0.04	0.09	0.79	0.30	1.36	0.28	1.48	0.65	1.43	0.15	0.77	0.23	0.73	0.03	0.22
CZE	0.09	0.35	0.38	0.70	0.29	0.51	0.26	0.26	0.09	-0.32	0.29	0.35	-0.14	-0.25	-0.05	-0.33
DEU	-0.06	-0.22	-0.17	-0.13	-0.11	-0.10	-0.09	0.05	0.01	-0.01	-0.10	0.11	0.08	0.05	0.02	0.14
DNK	0.11	0.13	0.18	0.36	0.11	0.36	0.15	0.52	0.27	0.55	0.05	0.22	-0.05	0.10	0.08	0.41
ESP	-0.03	0.08	0.01	-0.08	-0.18	0.07	0.04	0.40	-0.04	0.40	0.05	-0.14	-0.21	0.09	0.19	0.22
FIN	0.16	1.59	0.80	3.29	1.20	4.20	1.35	4.36	1.52	4.87	0.65	1.69	0.40	0.89	0.16	0.22
FRA	0.05	0.00	-0.03	-0.05	0.06	0.12	0.08	0.43	0.12	0.41	-0.09	-0.07	0.11	0.23	0.03	0.26
GBR	0.04	0.58	0.16	1.21	0.29	1.39	0.48	1.76	0.44	1.59	0.11	0.62	0.14	0.18	0.08	0.25
HUN	0.01	0.24	0.20	0.44	0.05	0.48	0.08	0.30	-0.20	-0.40	0.20	0.24	-0.07	-0.03	-0.03	-0.35
IRL	-0.81	-0.38	-0.52	0.36	0.09	1.29	0.27	0.94	0.13	1.22	0.32	0.76	0.31	1.53	0.25	-0.02
ISL	-0.15	0.02	-0.28	0.37	-0.11	0.76	-0.20	0.45	-0.07	0.88	-0.04	0.46	0.22	0.23	0.06	-0.16
ITA	-0.09	0.05	0.00	0.22	-0.02	0.57	-0.03	0.48	-0.06	0.59	0.12	0.17	-0.01	0.35	-0.01	-0.04
JPN	0.09	-0.11	-0.01	-0.19	-0.01	-0.21	-0.01	-0.29	-0.02	-0.34	-0.09	-0.07	-0.01	-0.03	0.02	-0.02
KOR	0.08	0.10	0.10	-0.05	-0.04	-0.27	0.09	0.34	0.14	0.58	0.01	-0.17	-0.13	-0.13	0.17	0.62
LUX	-0.11	-0.24	-0.10	1.27	0.36	2.92	1.04	3.09	0.39	1.56	0.02	1.52	0.48	1.54	0.62	0.32
MEX	0.19	0.20	0.29	0.61	0.19	0.34	0.24	0.06	0.58	0.27	0.11	0.41	-0.16	-0.22	0.05	-0.06
NLD	0.04	0.24	0.14	0.55	0.24	1.01	0.26	0.89	0.04	0.38	0.11	0.32	0.11	0.45	0.03	-0.01
NOR	-0.01	0.23	0.33	0.26	0.37	0.12	0.28	0.14	0.32	0.12	0.32	-0.05	0.01	-0.07	-0.05	0.03
NZL	-0.07	-0.05	-0.10	-0.07	-0.09	0.02	-0.06	0.10	0.04	0.16	-0.02	-0.01	0.02	0.07	0.03	0.08
POL	-0.61	0.35	-0.51	0.54	-0.27	0.93	-0.39	1.08	-0.50	1.57	0.16	0.24	0.28	0.23	-0.09	0.07
PRT	0.23	0.32	0.28	0.41	0.33	0.83	0.48	1.03	0.37	0.86	0.04	0.08	0.07	0.42	0.15	0.22
SVK	-0.15	0.13	0.09	0.51	-0.01	0.54	0.10	0.57	0.01	0.16	0.25	0.37	-0.11	-0.02	0.10	0.02
SWE	0.17	0.46	0.27	0.46	0.15	0.44	0.14	0.49	-0.14	0.35	0.12	0.05	-0.08	-0.04	0.01	0.08
TUR	0.13	0.35	0.36	0.53	0.24	0.65	0.24	0.45	0.81	1.96	0.23	0.18	-0.06	0.04	-0.18	-0.20
USA	0.07	0.10	0.11	0.08	0.11	0.18	0.15	0.30	0.14	0.28	0.04	-0.03	-0.01	0.11	0.03	0.10
OECD	-0.02	0.17	0.08	0.45	0.13	0.67	0.19	0.73	0.19	0.72	0.11	0.29	0.05	0.25	0.06	0.09
ZAF	-0.06	-0.25	-0.14	-0.65	-0.29	-0.88	-0.10	-0.37	0.05	-0.04	-0.06	-0.43	-0.18	-0.22	0.11	0.50